DAVCO DR-30

DAVCO 64

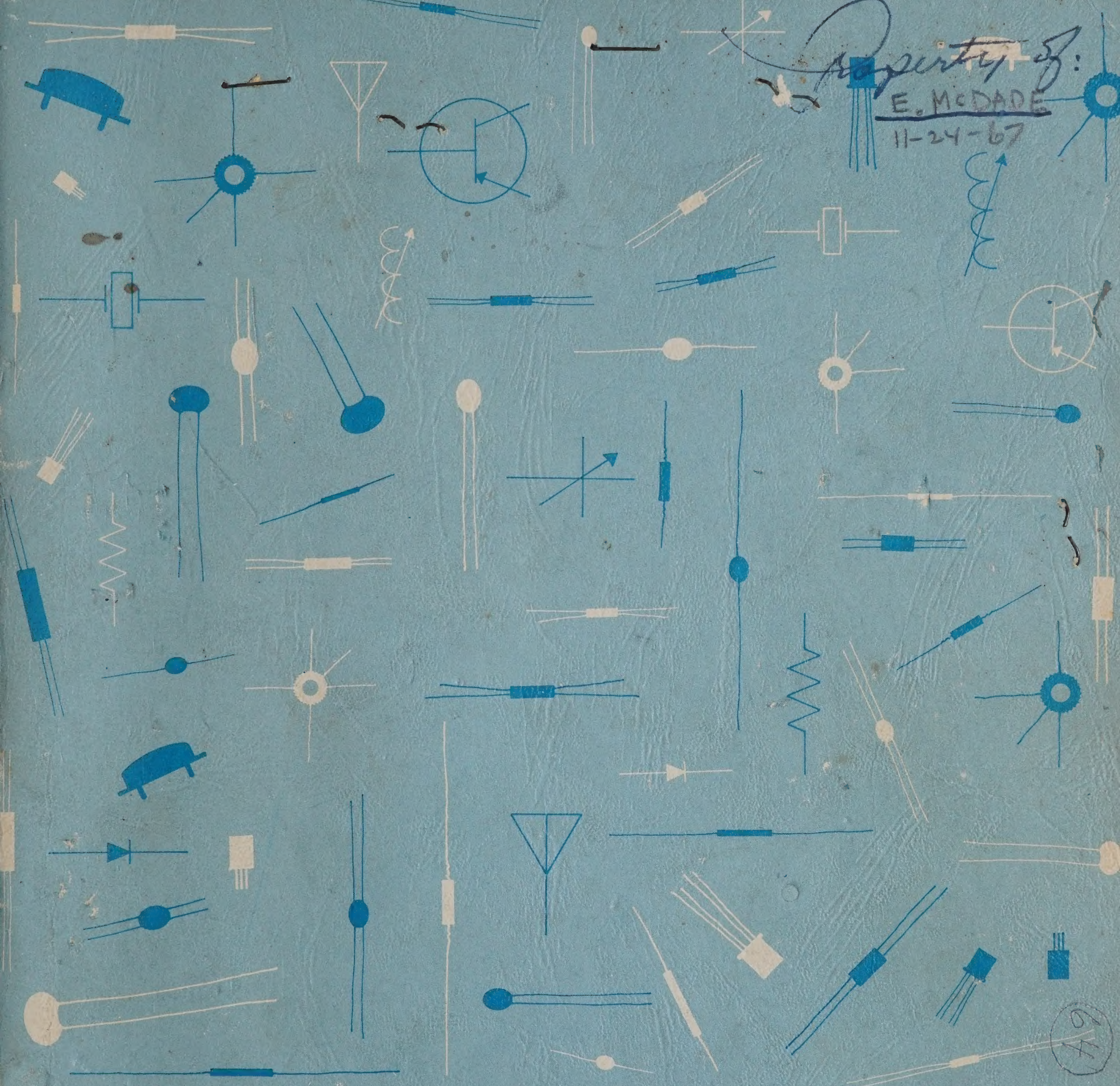
June 1967 CQ p47 Radio Shack receiver $120.

9-21-67 HW-16

Oxford

STOCK No. 752⅓

MADE IN U. S. A.



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DAVCO

LECTRONICS INCORPORATED

TECHNICAL
DR-30
COMMUNICATIONS RECEIVER
MANUAL

ADVANCED SOLID-STATE COMMUNICATIONS

DAVCO

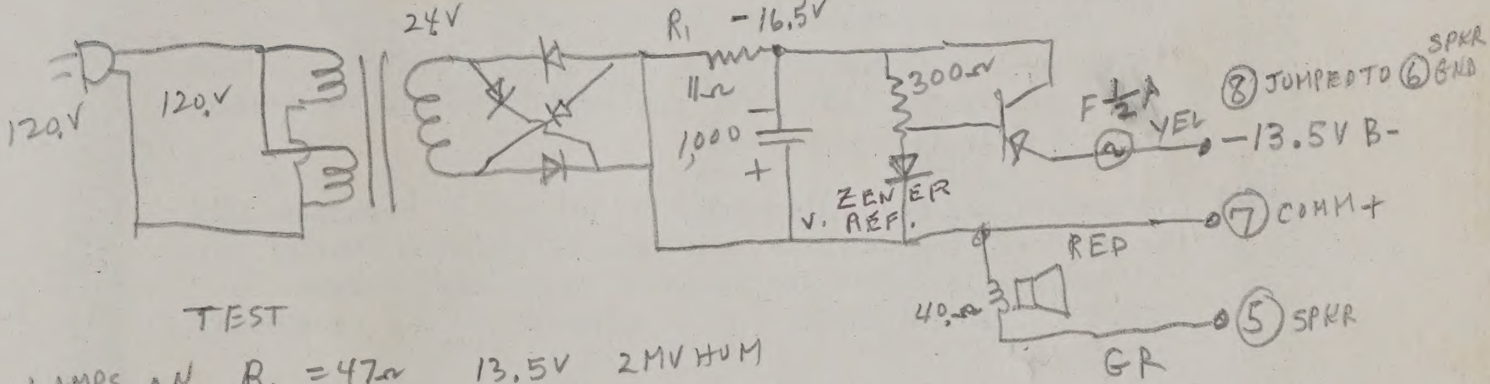
SYMPTOM: LOW SENSITIVITY

DIAGNOSIS: K150Y PRESTAGE MOSFET-TRANSISTOR MISSING

BE REAL CAREFUL REPLACING THE MOSFET K150Y. IT COMES SHORT CIRCUITED. DON'T REMOVE METAL BAND BEFORE WRAPPING THIN WIRE AROUND LEADS. DON'T REMOVE WIRE BEFORE INSERTING TRANSISTOR.

DAVCO ELECTRONICS, INC., TALLAHASSEE, FLORIDA

OPERATION
INSTALLATION
SERVICE
MANUAL



TEST

LAMPS ON $R_L = 47\Omega$ 13.5V 2MV HUM

LAMP OFF $R_L = 94\Omega$ 13.5V 1MV HUM

NOTE R_1 LOWERED WOULD PREVENT HUM ON LOWER LINE VOLTS

DR-30
COMMUNICATIONS RECEIVER

WARRANTY

All DAVCO products are warranted for six months from the date of shipment against defects in material or workmanship under normal use and service. Should any product prove defective during the warranty period, it will be repaired or replaced at no charge by DAVCO ELECTRONICS, INC.

This warranty shall apply only to the original purchaser unless the transfer of ownership is reported in writing to the Service Department of DAVCO ELECTRONICS, INC., prior to the appearance of the defect.

This warranty is not voided by work done in accordance with DAVCO recommended service procedures and with the recommended tools and instruments.

This warranty is totally voided by (a) use of corrosive flux or solder; (b) obvious evidence of physical abuse; or (c) failure to follow instructions regarding connections. DAVCO ELECTRONICS, INC., is not liable for consequential damages.

1-3.

CERTIFICATION

DAVCO ELECTRONICS, INC., certifies that this instrument was thoroughly tested and inspected prior to shipment from the factory. When shipment was made the instrument was free from any defect and met all published specifications.

SSB-CW SENSITIVITY

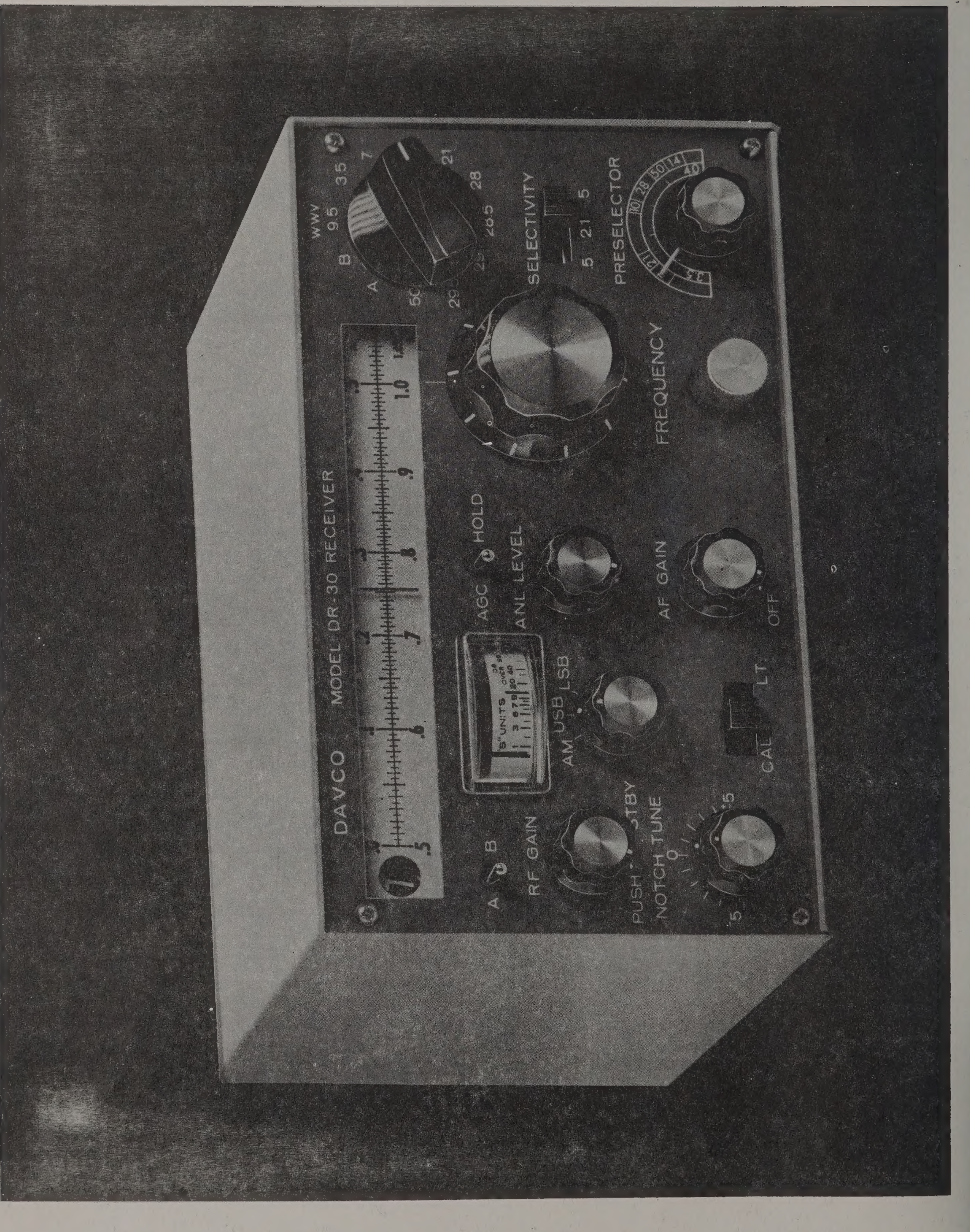
All measurements made with Hewlett-Packard model 606B Signal Generator with calibration traceable to National Bureau of Standards and other equipment of industrial standards.

Signal level, in microvolts, required at antenna input for a signal-noise-to-noise ratio of 10 db; medium (2.1 kc mechanical filter) selectivity.

9.8 Mc ________
3.8 Mc ________
7.3 Mc ________
14.3 Mc ________
21.3 Mc ________
28.3 Mc ________

28.8 Mc ________
29.3 Mc ________
29.8 Mc ________
50.3 Mc ________
A ________ Mc ________
B ________ Mc ________

MODIFICATIONS	COVERAGE	PRESELECTOR SETTING
BAND A		
BAND B		
OTHER		


DAVCO
MODEL DR-30 RECEIVER
WWV
B
9.5
3.5
7
21
28
28.5
29
50
A
SELECTIVITY
5
2.1
.5
PRESELECTOR
FREQUENCY
AGC
HOLD
ANL LEVEL
AF GAIN
OFF
AM
USB
LSB
"S" UNITS
DB OVER S9
CAL
LT
RF GAIN
STBY
PUSH
NOTCH TUNE
A
B

1-5. Introduction

DR-30 COMMUNICATIONS RECEIVER

You have chosen one of the finest pieces of electronics equipment available. Like most radio receivers, the DR-30 can be operated with a minimum of experience, and, with the DR-30, better than average results will be achieved. The provision of a slow tuning rate, effective Automatic Gain Control, and excellent selectivity assure superb and simple performance under normal conditions.

Operation under marginal conditions of noise, band crowding, and weak signals offers a challenge to equipment and operator alike. The DR-30 is designed specifically to meet these conditions and you, the operator, can quickly learn your part of the team-work. You'll find an almost unlimited number of tuning techniques to meet any condition.

We suggest that you read very carefully the following sections on connecting your receiver and that you follow the instructions. When you have the receiver ready for operation, connect it to an antenna--or a piece of wire--and simply experiment. Try all the controls; see what they do. Listen to foreign broadcast stations, WWV and amateur transmissions on AM, CW, and SSB. After a few minutes of listening you'll be better prepared for a careful reading of the following detailed description of control functions and circuit operation. By a thorough understanding of each receiver feature, you'll be able to take advantage of the highly unusual capabilities of the equipment.

Your DR-30 receiver is a precision instrument incorporating the latest state-of-the-art design features. Your experience with it will allow it to earn your respect. Put it to all the tests: you'll continue to be happy with its versatility, its reliability, and its superlative performance.

DAVCO ELECTRONICS, INC.

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2-1. Unpacking

This instrument was inspected both mechanically and electrically prior to shipment. Performance data from these tests is registered in section 1-2 of this manual.

Carefully remove the receiver from its packing material. The receiver may be lifted from its container by the tape handle lying across the front panel. As soon as the receiver is sufficiently raised, grasp it firmly. Do not rely on the tape handle for transfer to a working space or inspection surface.

Examine the receiver carefully for any signs of damage which may have occurred in transit. If any signs of such damage appear, file a claim immediately with the carrier and notify DAVCO ELECTRONICS, INC., of the apparent nature of the damage. Retain all shipping labels and packing materials.

You will note a package of small connectors and other parts. Check the contents of this package against the list below and report any shortage to DAVCO ELECTRONICS, INC. Additional connectors may be purchased from any radio parts supplier.

PARTS LIST

P30x-CCT ?

2	100-125 mfd electrolytic capacitors
1	8-connector Jones Plug (2 in export shipments)
3	RCA phono plugs (6 in export shipments)
1	length 2-conductor speaker wire
1	short length bare wire
2	lengths colored hook-up wire
1	lockwasher (8-32)
1	wing nut (8-32)
1	instruction manual
	extra crystals, if any, are installed in the receiver unless otherwise noted.

Please refer to section 1-3 of this manual for details concerning any modifications of this particular receiver and factory-installed crystals. Also check the serial number on the rear panel of the receiver against that shown in section

2-2. Preparation for Use

Connecting the DR-30 for operation is simple. You should read the summary below covering power supplies, antennas, and speakers, then wire the connector plug, read the more detailed discussions of installation, and put the receiver in service. You will find that an understanding of the receiver's capabilities will assist you in choosing which type of power supply, speaker, and other connections are most suitable for your own installation.

For operation the DR-30 must be connected to (a) an appropriate power source, (b) a speaker or earphones, and (c) an antenna/ground system. The power and speaker connections are made through the 8-connector Jones Plug on the rear panel. The antenna/ground connections are made through the other real panel connections provided.

Power Source: The DR-30 operates from 12-16 volts DC. Stability is not affected by variation of input voltages within this range. Although voltages to critical circuits such as oscillators are internally regulated by zener diodes, a correct supply should have good filtering and either regulation or an adequate reserve output. Improper filtering is indicated by a loud hum from the speaker. To determine regulation, measure the voltage under a full load of high output with the panel lights on. The voltage should not drop below 11.5 volts on loud audio nor rise above 15 volts with little audio.

Any power source used must meet these general requirements:

A. A nominal 12 volt minimum DC output under a load of 100 milliamperes or more.

B. Regulation or reserve output so that the output does not vary more than from 12 volts under load to 15 volts with no load.

Also essential for AC sources are

C. Good filtering.

D. Isolation from the AC line to eliminate any shock hazard.

The following power sources will provide the proper voltage:

A. A battery-pack (flash-light cells, for example).

B. A 12 volt automobile electrical system or a 6 volt system plus extra batteries.

C. The DAVCO DR-30s AC/battery-pack power supply.

D. A transformer-type homebuilt AC power supply.

E. A lab, service bench, or other commercial DC power supply.

The above power sources are discussed in detail in following sections.

Speaker: The DR-30 audio system operates most effectively with a 45 ohm loudspeaker load, but a 16 or 8 ohm speaker can be used with only a slight loss in audio output capability. A 3.2 ohm speaker is not recommended.

An automobile speaker can usually be used with the DR-30 if instructions regarding connection (see section 2-8) are followed. An intercom, TV replacement, or high-fidelity speaker will also give good performance. You should not expect adequate performance or power-handling capability from a tiny portable-radio replacement speaker. If you are purchasing a speaker for use with the DR-30, use the notes in section 2-10 as a guide.

2-3. Electrical Connections

Connections for the external power source (battery or power supply) and speaker are made by use of the 8-connector "Jones Plug" on the rear of the unit. Red, black, and paired white wire is provided for the first connection: choose your own colors and lengths for custom installation.

Jones Plug wiring

pin 1: no connection
pin 2: no connection
pin 3: jumper to pin 4
pin 4: jumper to pin 3
pin 5: one side of speaker
pin 6: Negative supply in series with STBY switch for muting purposes; oscillators remain functioning when off or on. If no external muting is employed, jumper to pin 8.
pin 7: POSITIVE (+) power connection
pin 8: NEGATIVE (-) power supply connection

The other side of the speaker goes to pin 8 or pin 6 depending upon the muting system used; use the one which provides least pop when going to the STBY mode. Note that this means that one side of the speaker is connected directly to the NEGATIVE power supply connection; see speaker and power supply sections in this booklet for further information.

Before proceeding any farther, continue reading about power supply requirements, speakers, antennas and other matters in the pages which follow.

DO NOT PLUG IN THE JONES PLUG YET!

2-4. Operation--The First Time

Double check the polarity and chosen color coding of the power wiring. Solder the wires to the Jones Plug terminals. Make the battery-power supply connections and the loudspeaker connections as indicated.

Insert the Jones Plug in the receptacle on the rear of the receiver. Plug some antenna (use a phono connector) in the ANT I jack. (If a piece of wire is used temporarily in a steel frame building, make an effort to drape it out a window.)

Turn on the DR-30 with the panel switch on the AF Gain control. Move the panel lights switch to the LT position to see that the lights are working. (A polarity diode at the power supply input connection prevents operation and damage from incorrect connection.)

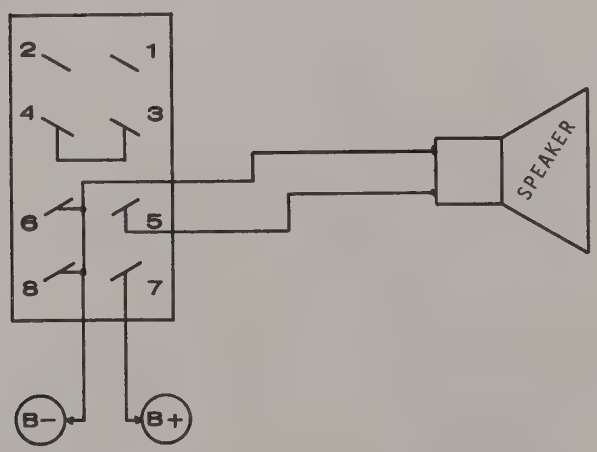
PULL the RF Gain Control "out"; this is the STBY switch and the receiver does not operate with the control pushed "in".

Be sure the Notch Tune, the RF Gain, and the ANL Level control are fully counter-clockwise. Choose your band of operation; turn the preselector until the pointer matches the band in use, and, with the audio gain turned up, peak receiver or antenna noise heard at that frequency.

Most controls are self-explanatory, so tune in various signals to get to know the applicable controls. After achieving some familiarity read the remaining portion of this manual for further details concerning exact control functions.

BACK VIEW

MALE JONES PLUG



2-5. Typical Control Settings

SINGLE SIDEBAND RECEPTION

AGC HOLD: in "hold" position--to the right
RF GAIN: fully counterclockwise; pulled "out"
PRESELECTOR: peaked on desired frequency: fine adjustment for peaking on noise.
AUDIO GAIN: advanced until background noise is audible
SELECTIVITY: 2.1 kc.
FUNCTION SWITCH: usually LSB for 3.5 and 7 Mc bands; USB for others.
NOTCH TUNE: fully counterclockwise
ANL LEVEL: fully counterclockwise
TUNING: operating in the SSB portion of an amateur band, very slowly adjust the tuning control until a voice signal sounds natural. If no tuning adjustment results in a natural sound, try changing the function switch to the other SB position.

The sharpness of the notch makes this tuning critical. Retuning the main tuning control necessitates retuning the notch.

If noise is present, advance the ANL LEVEL control as suggested in the Control Function section.

CW RECEPTION

Controls as in SSB reception, but the selectivity control may be in the 2.1 or .5 kc position. When the narrow filter is used, note that one particular audio tone stands out when tuning; this tone corresponds to the center of the filter bandpass and is the point where the S-meter will read highest. This is a very sharp filter and is most effective for digging a weak station from the midst of a number of stronger ones or for listening in the presence of considerable noise. The Notch and ANL should be used when required.

AM RECEPTION

FUNCTION SWITCH: AM position
SELECTIVITY: 5 kc if conditions permit; otherwise treat as if signal were SSB.
NOTCH TUNE: The notch is extremely useful for receiving AM under normal, crowded conditions. The noise limiter can cause distortion, and is of limited effectiveness on AM. However, the effectiveness of the noise limiter can be improved somewhat by reducing the RF input (turning the RF Gain clockwise) until the AGC is not actuated (little or no S-meter indication).

When using the notch in AM reception, note that elimination of either the desired or the undesired carrier stops the whistle: make sure you null the undesired carrier.

2-6. What to Expect From the DR-30

The DR-30 is a high-performance receiver designed to bring you the maximum ease and pleasure under any operating conditions. To take full advantage of your DR-30's capabilities, please remember that the signals you receive will be influenced by several factors.

First, they will be stronger if you use a good antenna and will be rather weak if you use only a short piece of wire. The DR-30 has superb sensitivity; it can compensate very well for short antennas, but there is no substitute for an adequate installation.

Second, the strength of signals on various frequencies varies with the time of day. The lower ranges, 3.5, 7, and 10 Mc., are strongest in the late afternoon, evening, night, and very early morning hours. The higher frequencies, 14, 21, 28, and 50 Mc., are stronger during the daylight hours.

During the evening your DR-30 will offer good reception of the low frequency bands even when used with a minimum antenna. During your first operation of the DR-30, listen for foreign broadcast stations on the 10 and 7 bands and then for amateurs using AM, CW, and SSB on the 7 Mc. band. If your first operation is in the daytime, you will find a number of amateur stations on the 7 and 14 Mc. bands.

Third, even in your first temporary connection be sure to use a ground for the equipment. During your first operation you will be learning to use the DR-30; don't handicap yourself by choosing conditions that are not typical of those under which you'll be doing most of your operating.

Fourth, if you use a poor antenna your location will affect reception. City areas often have high radio noise levels, but the noise blanker circuitry of the DR-30 is specifically designed to provide the best possible communications under such conditions. The use of this control will pull in signals that cannot be heard on other receivers.

Also, a metal-frame building will shield the antenna from signals. Try to have the antenna outside if at all possible.

Fifth, signal levels on most bands are great enough to keep the DR-30's S-meter well towards its higher ranges when a reasonable antenna is used and when operating conditions are normal. The weaker signals will move the S-meter only a little but will usually be quite clear and readable.

You will find that after only a few minutes practice the operation of the DR-30 controls is quite simple. Usually you'll just choose the mode of operation and the band, peak the preselector, and tune in the stations. The automatic gain control built into the receiver makes use of the volume control rarely necessary.

The other controls on the receiver, including the Notch-tune, the ANL level, selectivity, etc., are provided for use when conditions are challenging. A little more experience will teach you proper use of these circuits, and you'll be surprised at the capabilities the DR-30 shows under the most trying conditions.

The DR-30 is designed for pleasure in operating. It provides the best possible combination of operating simplicity with extra performance. Each circuit and feature has been provided without compromising other circuits. The construction techniques and components used assure the maximum in trouble-free enjoyment of these capabilities.

2-7. Battery Operation

The DR-30 performs very well on battery power packs, and such sources are recommended for fixed station as well as for portable operation. The use of batteries reduces or eliminates power-line carried noise and interference. In some installations this advantage may outweigh the slight expense of periodic battery replacement.

The DAVCO DR-30s power pack contains holders for nine type D cells, a battery level indicator, a 110 volt power supply, and a speaker. A front panel switch selects AC or battery operation.

A compact and convenient battery pack for portable use can easily be assembled at home using

A. Two six volt lantern cells (Eveready 510S or equivalent) plus a D size flashlight battery in series.

B. Nine size D flashlight cells in series. Convenient holders may be obtained in most radio stores.

The above combinations will give about three months intermittent operation (two or three hours a day) if the panel lights are not used.

C. Nine size C flashlight batteries in series.

Battery life will be cut to about half the above.

Please note the following cautions:

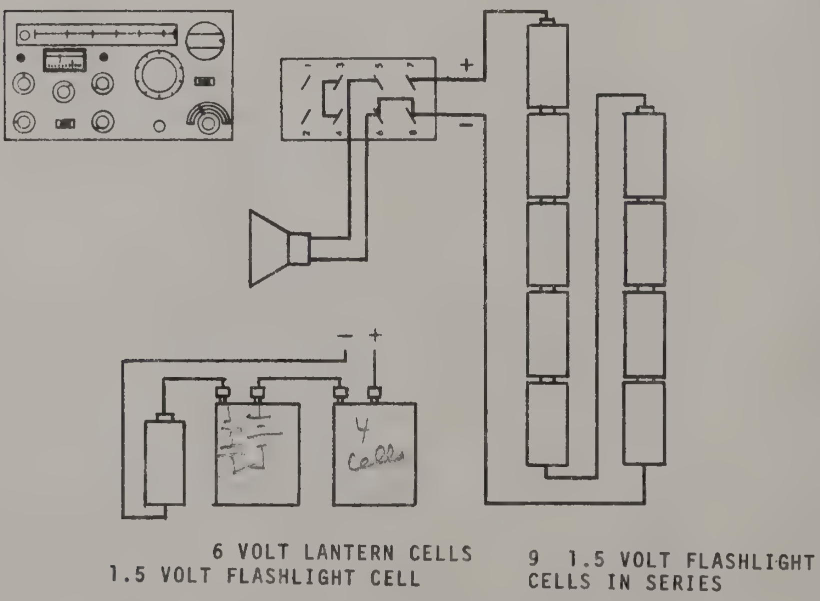
1. The panel lights on the DR-30 consume more power than the rest of the entire receiver system. In battery operation use the lights as sparingly as possible to extend battery life.

2. Batteries are quite sensitive to temperature extremes. Any temperature comfortable for the operator will not harm the batteries, but they should be protected nonetheless.

3. Almost all batteries bought off-the-shelf will show less than the rated voltage. After a short period of operation under load the voltage may be down considerably even though the batteries can continue to be used for some time. Therefore it is strongly recommended that a battery pack consist of a nominal 13.5 volt battery combination rather than a nominal 12 volt combination.

4. If power supply voltages exceed 13.5 volts by a great amount, the S-meter readings will tend to be too high. Make allowances for this effect if you use higher voltages.

A diode inside the receiver prevents damage should you connect the receiver power leads to the wrong polarities. Although the dial lights will operate, you will hear no stations and the S-meter will not be at the zero position. Remove the power leads immediately and connect them correctly, following the charts provided.



2-8. Mobile Installation

Most mobile installations are in automobiles with 12 volt electrical systems. To utilize this system, determine the polarity of the automobile chassis by examining the battery and its cables. One cable will lead from a battery terminal to the automobile chassis and the terminal will be marked + or -, indicating the polarity. Set the toggle switch on the rear of the receiver to match the receiver chassis polarity to that of the automobile, up for a positive ground system and down for a negative one. Connect the receiver as shown in the appropriate diagram.

The low power consumption of the receiver allows the use of almost any wiring available. Suitable wiring runs to the cigarette lighter, to the ignition switch, and to any other electrically operated accessories. Be careful, of course, to choose a non-switched source. The "cold" power lead can be connected to almost any point on the automobile chassis not mounted on plastic or otherwise insulated, but for best results a wire of 20 gauge or larger should be run directly to a battery terminal.

In a mobile installation always use a fuse in the "hot" battery lead to protect the automobile system when the receiver is not connected and while it is being installed. Without this protection the power leads for the receiver can short out, damaging the leads and draining the battery.

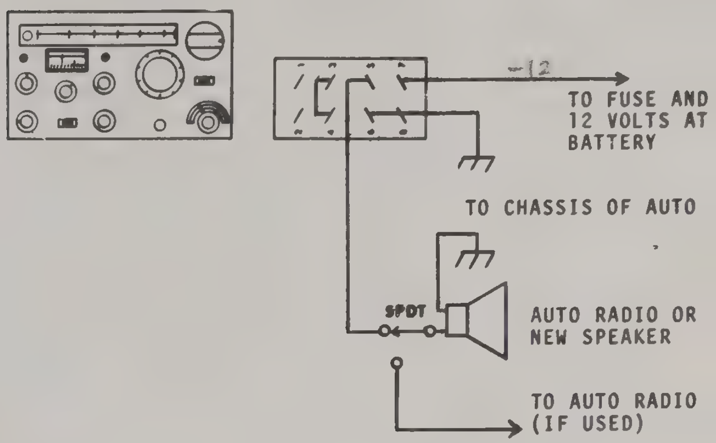
The most convenient way to operate the receiver in a car with a six volt system is to install a six volt lantern cell in series with the car's own battery supply. Be sure to install the extra battery cell in a place which is not subjected to abnormally high temperatures. Carefully observe the car's polarity and install the battery in series in the "hot" lead, proceeding as above.

Speakers: One side of the speaker connection to the receiver is also the negative power supply connection. Therefore in an automobile with negative ground one speaker lead can simply be grounded to the automobile chassis when a speaker other than the automobile radio speaker is used. In a positive-ground car, however, neither speaker lead should be grounded to the automobile chassis, and two separate leads should be used.

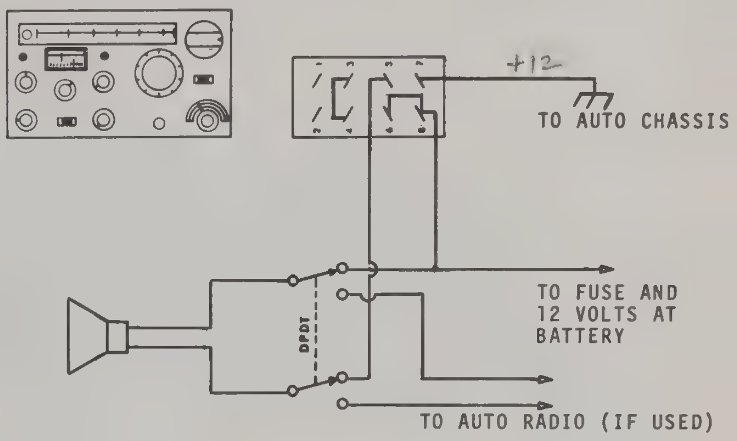
When using a car radio speaker, it is not possible to parallel the outputs of the two receivers. A double-pole/double-throw switch must be installed to disconnect completely the receiver not in use. In a positive ground car it may also be necessary to unground one side of the speaker and run a separate lead to each terminal from the changeover switch.

Note: If ignition noise is a problem, independent battery operation rather than use of the car's system may substantially reduce or eliminate the difficulty.

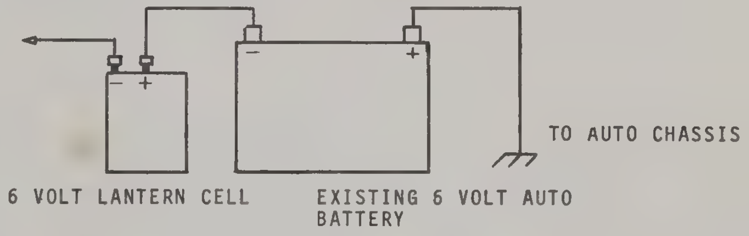
INSTALLATION IN 12-VOLT NEGATIVE-GROUND AUTOMOBILES

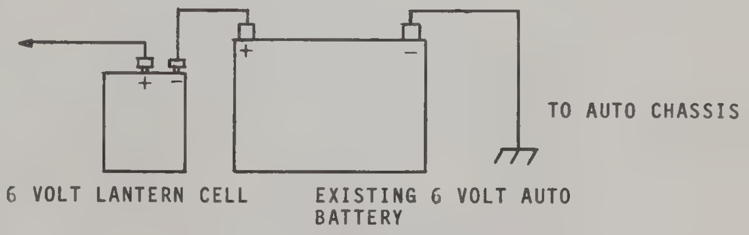


INSTALLATION IN 12-VOLT POSITIVE-GROUND AUTOMOBILES



6-VOLT POSITIVE-GROUND AUTOMOBILE INSTALLATION





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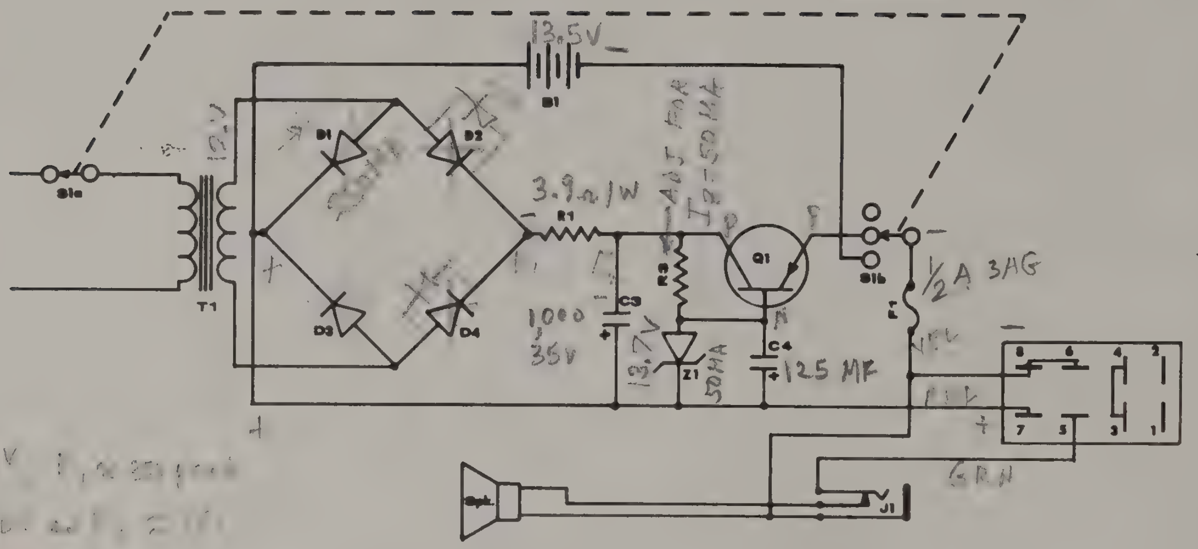
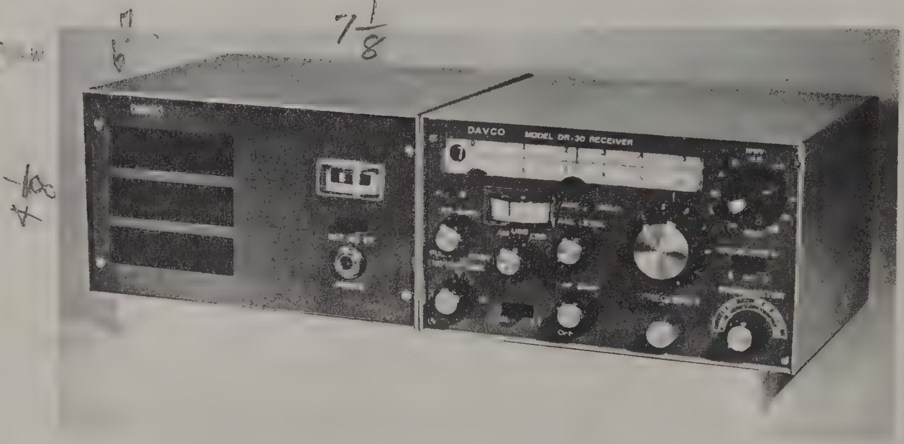




Although we recommend battery operation of the DR-30, the owner may avoid the periodic expense of replacing batteries by using a small, easily constructed power supply, to provide the desired 13.5 volts dc from an ac line.

A suitable supply can be built very inexpensively with locally available components. The DR-30-s supply built by DAVCO contains a circuit similar to #1 below, a loudspeaker, and holders for nine D cells.

Note: For many builders, the availability of components will be the deciding factor as to the choice of supplies. Supply #1 below will cost about $17.00, supply #2 about $13.00.

Power Supply #1:

This power supply is fully regulated electronically, so it is more suitable than #2 as a general-purpose supply both for the DR-30 and for other station accessories within the limits of its power rating.

Power Supply #2:

This unregulated supply uses a minimum of components and provides quite satisfactory operation. It has enough reserve output to allow the internal regulators of the DR-30 to provide stable operation.

A simple chassis layout is shown in the photographs. Component arrangement is not critical and can be varied to suit your application.

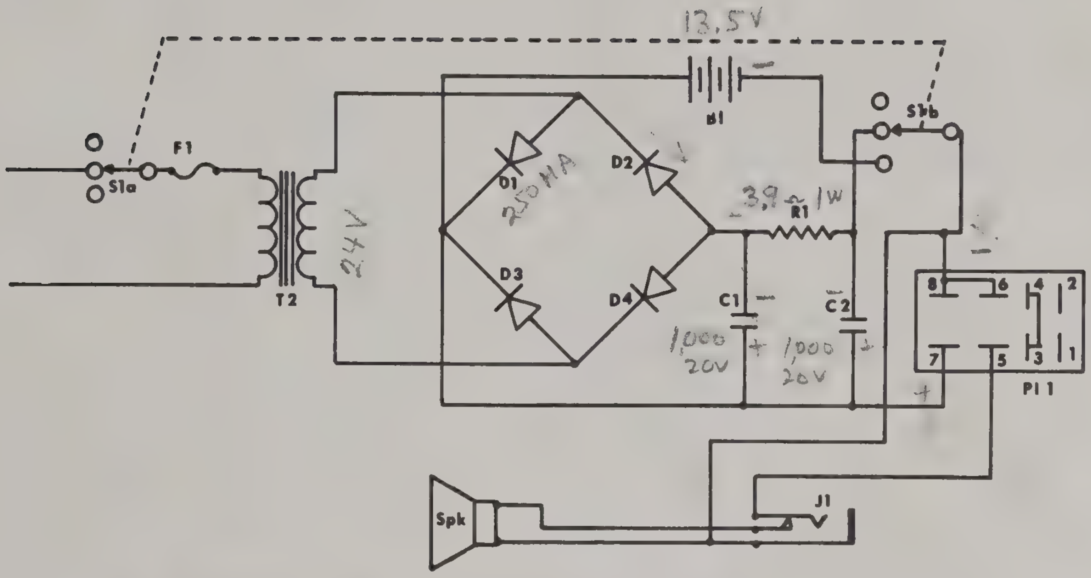
Notes on Components

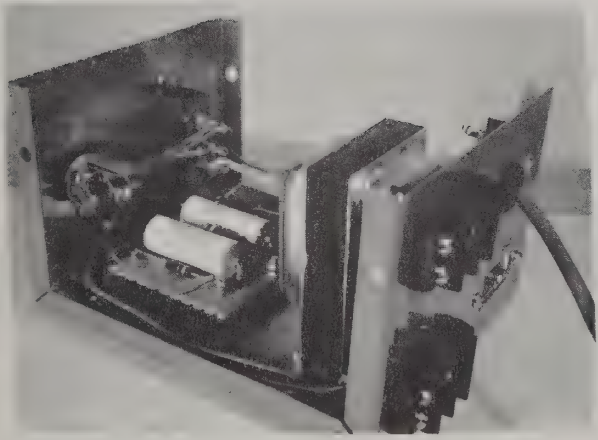
CR1: Silicon rectifier, rated at 250 ma. or more, with voltage rating (piv) 50 volts or more.

CR2: Zener diode, rated at 1 watt or more, with zener voltage of 13.6 volts. If a 13.6 volt unit is not available, use two 6.8 volt diodes in series or some other combination totaling 13 to 14 volts.

2-9

#13





C1, C2: Electrolytic capacitors readily available from distributors of electronic components. If necessary, add two or more capacitors in parallel to obtain the desired capacitance. Capacity values greater than those indicated are quite suitable.

Q1: Power transistor. Any general purpose audio power **transistor**, type **PNP germanium**, can be used if its power rating exceeds 5 watts. This transistor must be mounted on a heat sink. Use either a commercial extruded aluminum one or bolt the transistor to the power supply chassis, employing a mounting kit that insulates the transistor from the chassis.

Note: In power supply #1, the potentiometer R3 should first be set for maximum resistance. With the supply unloaded, adjust R3 so that the zener diode Z1 draws 50 ma. of current.

R 1	Resistor 3. 90 ohm	1 W
R 2	Resistor Vara 500 Ohm	5W WW
C 1	Cap. 1000 Mfd.	20 V
C 2	Cap. 1000 Mfd.	20 V
C 3	Cap. 1000 Mfd.	35 V
C 4	Cap. 125 Mfd.	15 V
D 1, 2		
D 3, 4	Silicon Diode 250 Ma.	50 PIV
Z 1	Zener Diode 13. 5-14 V	1 W
Q 1	Power Transistor HEP 200, GE 3 or equivalent	PNP
T 1	Filament Transformer 12 V 2 Amp. Merit P-2959 or equivalent	
T 2	Filament Transformer 24V 1 Amp. Merit P-2962 or equivalent	
J 1	Phone Jack 2 cond. Closed Circuit Switchcraft Little Jax Type 12A or equivalent	
F 1	Fuse Holder Littlefuse Type 357001	
F 1	Fuse 3 A G 1/2 Amp.	
S 1	Switch Slide DPDT	
	Chassis Minibox 5"L 4"W 3"H Bud CU2105	

2-10. Loudspeakers

The DR-30 audio system is at its best with a 45 ohm loudspeaker load, but 8 or 16 ohm speakers can be used with considerable success. A 3.2 speaker is not recommended.

A loudspeaker chosen for communications reception need not be of the highest quality. However, intelligibility of signals is related to the fidelity of reproduction, and certain minimum standards must be met. When possible use a large speaker with inherent good fidelity: the bandwidth-limiting devices built into the DR-30 are more than adequate for shaping the audio response.

A good speaker choice is an intercom speaker with as large a cone size as possible. These speakers are readily available in 45-ohm configurations, as are replacement or rear-seat auto speakers which are also recommended. Many inexpensive mail-order house speaker systems are also quite effective. Always choose the speaker with the higher impedance, if you have a choice. I. e., a 16 ohm speaker is preferable to a 4 or 8 ohm one.

Most small speakers, such as those sold for portable radio replacement, have neither the quality nor the power-handling capacity desirable for use with the DR-30. Low efficiency speakers such as the AR, KLH or acoustic-suspension types are not recommended.

Any speaker, regardless of type or size, should be mounted in an enclosure. The voice quality from an unmounted speaker is invariably tinny and the poor fidelity is not only distracting but actually interferes with good intelligibility. The enclosure should have a back although there may be ports on the front, back, or sides. (If a wall-mount enclosure is chosen, it will probably have an open back. Covering the back with a book or blanket will usually improve the quality; if so, cut a back and attach it permanently.)

When connecting the speaker in mobile installations, in muting systems, or with other equipment, remember that one lead always goes to the negative power supply connection.

No damage to the receiver will result if it is operated without a speaker.

2-11. Earphones

Since there are almost as many earphone connectors as there are sources of earphones, no jack is provided on the DR-30. However, you can readily connect a jack matching your earphones to the leads from the Jones Plug used for speaker connection. In addition, the DR-30s power pack provides a front-panel two-connection phone jack.

Any low impedance earphone can be used with the DR-30 although a magnetic type with impedance as close to 300-600 ohms as possible is the most suitable. If in doubt, try the earphone in question: no damage to the receiver will result if it is improper.

2-12. Grounding

A stud and wing nut (6-32) are provided on the rear of the receiver for grounding purposes. Any station's equipment should be safely grounded with heavy copper braid or wire to a cold water pipe or an earth ground to prevent shock hazard.

In addition, since the DR-30 can be used without connection to household wiring, it is important to note that for optimum performance the receiver should be grounded in the best method possible, even while operating from batteries. When coaxial feed line is used from the antenna, or when a good balanced antenna is employed, battery operation may be possible without a ground. Remember, however, that a radio on the end of a long piece of wire isn't a complete circuit, RF or otherwise, and that a ground is an essential part of the system.

Although the great sensitivity of the RF amplifier stages can under some conditions produce excellent reception when not grounded, the full potential of the DR-30 in weak signal reception as well as in various image and IF rejection characteristics is realized only when a satisfactory antenna and ground system are employed.

2-13. Antennas

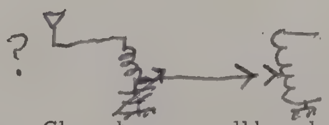
The DR-30 is a receiver of exceptional sensitivity. It is designed for use with a 50-70 ohm antenna, such as are designed for transmitting. Like a transmitter, the receiver can be used on a random-length wire antenna, but only with degraded performance unless a simple antenna tuner is employed.

The RF stage of the DR-30 will provide excellent performance on any antenna which is even marginally adequate for reception of the desired frequencies, including resonant mobile antennas, dipoles, beams, and most long wire antennas.

It may on occasion be desirable to operate on random short lengths of wire, although such "antennas" do not provide optimum performance.

These "antennas" may at a desired frequency present a load of 1,000 ohms or more, which should be transformed to the input impedence of 50 to 70 ohms of the DR-30 or any similar receiver to improve performance.

The impedences can be matched by a simple adapter consisting of an L-network section made of a coil and a capacitor, as below.



C1 can be any small broad-cast band tuning capacitor such as those used for the main tuning of imported portable receivers. The greatest possible capacity swing is desirable and may be obtained by paralleling two or more capacitor sections.

L1 can be a small coil of 30 to 50 turns of #28 wire wound on an old IF transformer core or any other iron of ferrite rod. Taps should be provided at each 10th turn for adjustment to the correct range.

Please note that on any adequate antenna the adaptor is not needed and its use is not recommended.

2-14. Connections with Transmitters

Any communications receiver should be protected from unusually high RF level, as extreme RF energies can melt coax cables, burn out controls, overheat RF coils and/or cause the breakdown of other components.

The solid-state construction of the DR-30 does not make it more sensitive to high RF energies than conventionally built receivers; to the contrary, it is very well protected indeed, and, under proper operating conditions, no difficulties will occur.

However, no matter how many times you've connected a receiver before, we request that you refresh your knowledge of normal muting precautions by reading the paragraphs below. A few minutes now may save an embarrassing mistake five minutes from now.

The DR-30 contains small diodes in the input circuit to the RF stage which prevent normal RF levels from damaging the receiver. However, these diodes do not protect the receiver from a direct application of transmitter energy to the antenna terminals.

Therefore, never feed RF energy directly from a transmitter into a receiver antenna connector. This warning may seem obvious, but accidents can happen. Be especially careful when making a temporary antenna connection to an existing station. Don't let anyone push the transmit button, no matter how rare the DX is, until a proper changeover provision has been made!

Changeover from transmit to receive is usually accomplished by removing the receiver from the antenna and simultaneously short-circuiting the receiver's antenna input circuit. This procedure will provide complete protection for the receiver, but be sure that the changeover occurs quickly enough to prevent any RF energy from the transmitter from entering the receiver.

Suitable changeover devices are, among others, commercially available coax relays and manual changeover switches operated as part of the station control.

In addition to the above provision, it may be necessary to turn off the receiver circuitry while transmitting, since a powerful transmitter can still cause an audible leakage of signal into the receiver. In this case, arrange the switching relay or other device so that the circuit between pins 6 and 8 on the Jones plug is broken during transit. Doing so disconnects the voltage to several of the receiver circuits so that signals can't leak through. Or, for non-automatic changeover, push the stand-by switch on the front panel of the receiver.

For further information, refer to the ARRL Handbook section on "Receiver Protection and Muting", the Radio Handbook (Editors and Engineers) section on "Transmitter Keying and Control", or the RSGB Handbook, 3rd edition, pages 250-252. Also, each of the amateur journals frequently publishes articles on station control circuits.

Many persons prefer to use different antennas for receiving and transmitting, thus avoiding a physical changeover of antenna connections. We encourage this practice if the following normal precaution is observed:

Always use some device, such as the external diode limiter described in the RSGB Handbook (page 252) or an electronic receiver input limiter as mentioned in numerous articles in amateur journals, to prevent RF damage to receiver leads and components. This precaution becomes extremely important at power levels of several hundred watts.

Many operators have successfully employed the DR-30 at high power levels without any protection whatsoever. However, because antenna characteristics vary immensely, it is not possible to give factory specifications for permissable operating powers. The practice is not recommended and is not covered by warranty.

For those who insist upon operating without protection, the following suggestions are important:

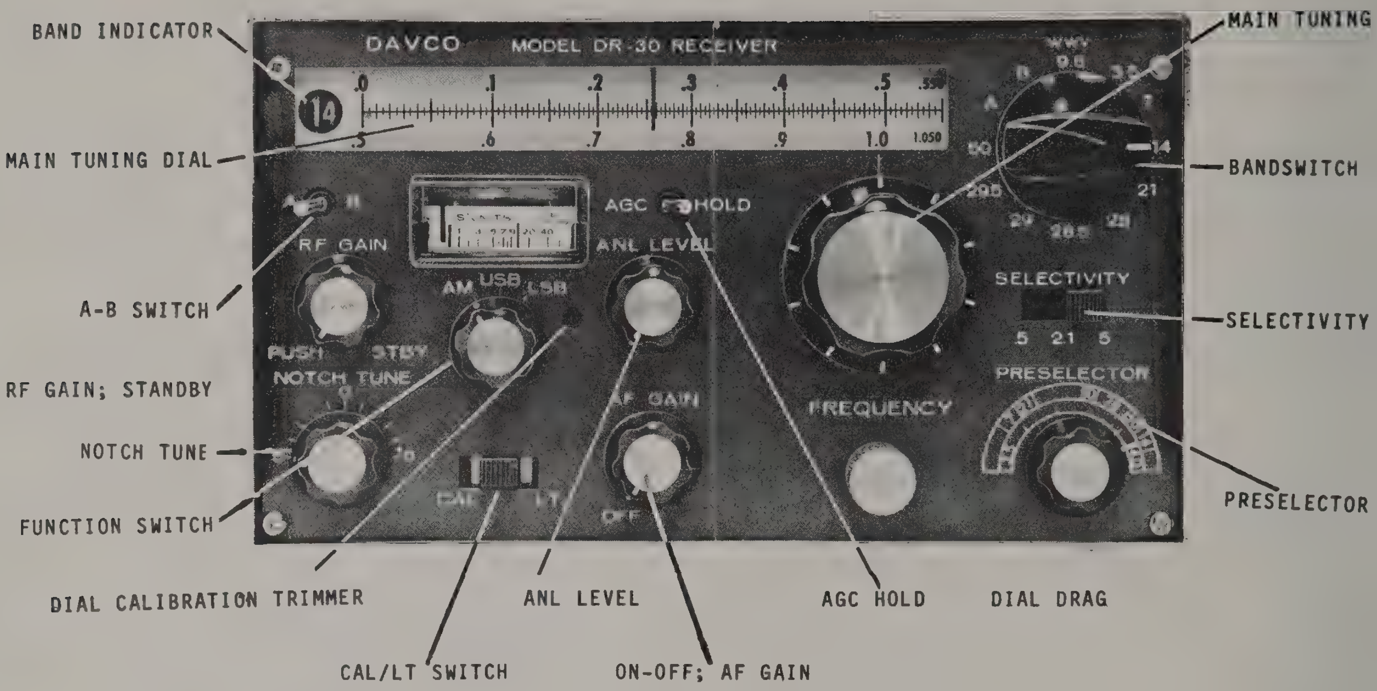
(1) Orient the transmitting and receiving antennas at an angle to each other. Do not attempt to run them parallel to each other for a long distance; high RF voltages will develop in the receiver antenna and the radiation pattern of the transmitting antenna will also be negatively affected.

(2) Separate the antennas from each other as much as possible.

(3) Be sure that a suitable ground is used for the receiver, as well as for the transmitter.

Note: The stand-by switch is in series in the circuit between pins 6 and 8. Turning the receiver to stand-by, by either the front panel switch or by the switching relay between the two pins, leaves the BFO, the VFO, the crystal conversion oscillator, and the filter amplifier still in operation so that they can be used with a companion transmitter or an accessory.

3-1. Control Identification Photograph



3-2. Controls in Detail

ON-OFF. --Rotate the AF Gain Control to the right to turn the unit on.

AF GAIN. --Varies the audio output; increased volume clockwise.

RF GAIN. --Actually an attenuator in series with the antenna, permitting adjustment of the amplitude of the signal reaching the RF stage. The maximum receiver sensitivity is obtained when the control is fully COUNTERCLOCKWISE. Turning the control to the right increases the attenuation, not the sensitivity.

STBY. --When the RF Gain control is pushed "in," voltages to circuits other than oscillators is turned off; the oscillators remain functioning for use with other equipment. This control effectively mutes the receiver when desired. Terminals on the Jones Plug also permit muting by a relay or external switch.

FUNCTION SWITCH. --A three position rotary switch with the following action:

- AM---the AM detector is in use
- USB --the product detector is in use and the USB crystal in the BFO is connected.
- LSB --product detector is in use, LSB crystal in the BFO is connected, and the VFO frequency is shifted so that the dial calibration remains essentially constant.

AGC HOLD. --This toggle switch allows the operator to select the decay time of the Automatic Gain Control system. The center position, for fast decay, is used for AM reception and band-scanning. The right "hold" position is effective in eliminating "thumps" and "clicks" in SSB and CW reception of strong signals, and the decay time is such that the AGC does not bring up the background noise between syllables of speech. The left position provides medium-hold time.

ANL LEVEL. -- Adjusts the threshold of the noise blanking action on SSB and CW. The ANL is most effective on ignition-type noise. To activate, advance the control clockwise until the noise disappears but not so far as to reduce the desired signal.

A-B SWITCH. --The A-B switch is a SPDT center-off toggle unit with its center pole connected to the positive side of the receiver power.
As provided, the A-position of this switch functions as a "tone control" for reduction of the high audio frequencies. The tone control function can be removed for other use of the control by clipping or unsoldering the white wire to the switch.

A lead to the connection is provided so that the B position can control accessory equipment such as the antenna switching relay, a phone patch, if not exceeding the maximum 5 amps and 115 volts rating of the switch.

BAND INDICATOR. --The significant megacycle figure for the band in use appears here. The frequency to which the receiver is tuned is indicated on the main tuning dial.

MAIN TUNING DIAL. --When the number in the INDICATOR window is red, read the red dial (.500 to 1.050 Mc.) scale and use the megacycle figure in the window. When the figure is white, read the black dial scale (.0 to .550 Mc.).

BANDSWITCH.--This switch chooses the frequency band in use, as indicated by the front panel markings and the drum BAND INDICATOR which appears in the window. The switch is continuously rotating.

MAIN TUNING. --The main tuning knob couples through a ball-bearing gear train to the main tuning capacitor. The indications on the skirt of the knob are 2 kc. each.

CAL-LT SWITCH. --The DPDT switch has a center-off position. In the CAL position, the internal 100 kc crystal calibrator is in operation. To allow the calibrator signal to reach the RF stage and to attenuate the signals from the antenna to avoid confusion, the RF Gain Control should be rotated to the right as far as necessary. The calibrator should be turned off when not in use to avoid undesired responses.
The LT. position turns on the panel lights. The lights more than double the power consumption, so it's recommended that they be used sparingly during operation from batteries.

PRESELECTOR. -- Tunes the RF input and output circuits to the desired frequency. In normal use, tune the preselector until the pointer is toward the MC marking corresponding to the band in use. Make the final fine adjustment by listening to the antenna noise or observing the S-meter on a received signal. Note that it is possible to tune the preselector to an image frequency and thereby cause incorrest reception: always start in the range of the marked frequencies. The preselector should be re-peaked when making a wide frequency excursion within the band, especially when operating on the lower bands.

DIAL LOCK. --The small knob just below the main tuning knob allows the operator to place an adjustable amount of friction in the main tuning mechanism. It should be adjusted for the appropriate dial "feel" which suits the operator. Turning this knob firmly can nearly lock the dial for fixed-frequency applications. The most frequent use of the drag mechanism is in mobile operation where finer tuning resolution can be achieved when some friction is used.

NOTCH TUNE. --The Notch Tune control adjusts the frequency of the rejection notch in the IF passband. This notch is capable of rejecting any single interfering heterodyne or carrier. The adjustment is critical. When not in use, the control should be turned to the 9 o'clock position.

SELECTIVITY. --The three choices of IF selectivity are provided for optimum interference rejection and fidelity on SSB, AM, and CW. Approximate bandwidths are indicated; refer to the technical description for details.

SCREWDRIVER ADJUSTMENTS:

DIAL TRIMMER: Next to the Function switch on the front panel.

Allows the operator to correct the dial calibration by about + or - 5 kc. Rarely used except to compensate for long-term aging of components. A small screwdriver should be used.

NOTCH DEPTH CONTROL: on the rear panel in the lower middle of the small panel section: accessible through a hole in the panel. Use a small screwdriver. This is a factory setting and should rarely need attention. See maintenance section for detailed instructions on depth setting.

CRYSTAL CALIBRATOR TRIMMER: Accessible through a hole in the panel near the right-hand side of the back. This screwdriver control is used to adjust the crystal calibrator so that its harmonic at 10 Mc falls exactly in zero-beat with the 10 Mc signal received from WWV. See instructions in maintenance section.

3-3. Back Panel Connections

There are seven phono-type connectors provided on the rear of the DR-30. The use of two of these for the standard antenna and the 6 meter antenna is discussed in the section on antennas.

The other five connectors provide access to various oscillators and filters in the receiver for use with companion transmitters or other accessories. Details of these circuits are as follows:

BFO connector: This connector gives output from the BFO, which is suitable for use as a carrier generator in SSB transmission. The approximate amplitude of the signal from this point is 250 mvolts, and the impedance is a nominal 500 ohms. Any connection to this point should have an input impedance of 1000 ohms or greater to reduce loading. Normal use would be into the base of a common-emitter BFO amplifier. A blocking capacitor is provided within the receiver.

The BFO operates even with the standby switch in the "off" position. This connection point also provides access to the 455 kc IF of the receiver, and is suitable for a panadaptor connection or for feeding a signal to an accessory. However, most panadapters will respond to the BFO signal itself when it is turned on. Panadaptors such as the Heath HO-13 are quite satisfactory when coupled to this circuit through a capacitor of about 50pf, when the BFO is turned off. Naturally, this signal is obtained after the selectivity circuits, so your panadaptor will show the signal after it passes through the IF.

VFO Output:

This connection provides output from the VFO, or main tuning oscillator. ANY CONNECTION TO THIS JACK MUST BE DC BLOCKED. That is, a small blocking capacitor (.01 mfd) must be connected in series with the output (inner connector). In all cases, shielded coax cable of a miniature type should be used for carrying this signal to an accessory.

The approximate output level of the oscillator signal is about 50 mv. The output impedance is around 2000 ohms, and a higher input impedance circuit should be used to amplify or isolate this signal. Do not load this circuit: any change in VFO amplitude reaching the second mixer may decrease the receiver gain.

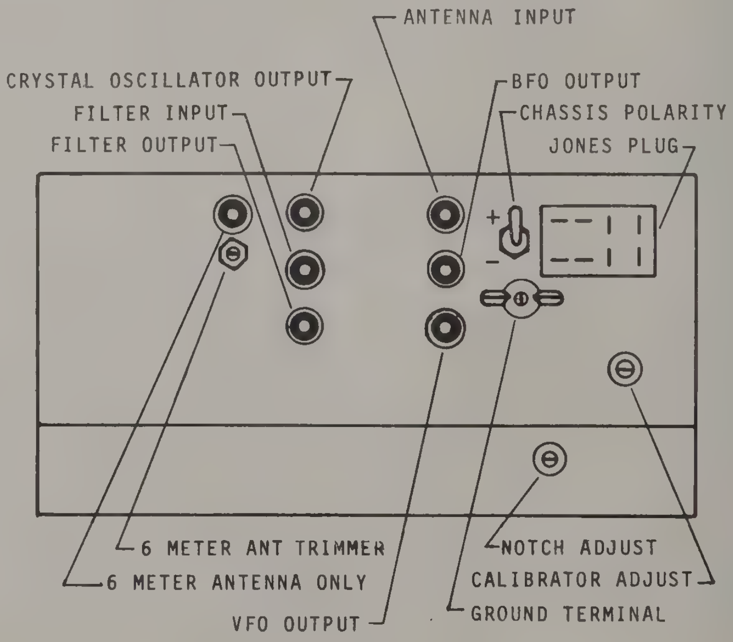
The output frequency of the VFO is in the range 1950 kc-2500 kc. Note that the VFO tunes in the opposite direction from the received signal; that is, the lower the VFO frequency, the higher the received signal frequency. (See block diagram).

Xtal Out:

This jack provides connection to the output from the crystal first conversion oscillator. This is a low level output of about 300 mv at an impedance of about 1000 ohms. Any connection to this jack should be DC blocked with a small capacitor (.01 mfd). This amplifier or circuit to which this signal is fed should have a high impedance to avoid loading. We suggest a simple field-effect transistor amplifier.

FIL in.
FIL out. These connectors provide input and output access for the Collins mechanical filter and its associated crystal filter and amplifier. Input impedance of the stage is about 3000 ohms and the output impedance is about 1000 ohms. To prevent loading the circuit, any connections made to this point should have a higher impedance than those listed above. Note that the output is through a switching diode (D7). To turn this diode "on" so this signal can pass through it, you must connect a 10k or 12k ohm resistor from the output connection to the minus power supply voltage (12 volts). This addition can be made either externally or inside the receiver on the wiring harness: connect the resistor from FILTER BOARD PIN C to FILTER BOARD PIN A. (See board page for pin layout).

The input also passes through a switching diode. A biasing network is provided internally for turning this diode "on". Pins 3 and 4 on the Jones Plug allow external switching of this diode by a companion transmitter.



3-4. Choosing Extra Crystal Ranges

The DR-30 is supplied with 10 crystals which provide coverage as noted in Section 1-9. In addition, the receiver has provision for adding extra crystals in the A and B bandswitch positions, thus allowing coverage of two more 550 kc segments in the range of 3 to 54 Mc.

When you are choosing extra bands for installation, keep these points in mind:

A. For direct calibration you must choose bands which start either on a megacycle or a half-megacycle, for example, 12.500 - 13.050 Mc, 52.000 - 52.550 Mc. You then need to remember only the "color" and the significant megacycle figure to allow a direct readout of receiver frequency.

If it is absolutely necessary to cover an odd frequency band, try to simplify the readout by starting on a band which begins with a 100 kc point. For example, the US Citizen's Band includes channels which run from 26.965 Mc to 27.255 Mc. Direct readout could be obtained by using two bands (26.500 - 27.050 and 27.000 - 27.550 Mc.) A more practical coverage, though, is 26.900 - 27.450 Mc in one band; you use 27 as the significant megacycle, read the black dial scale, and subtract 100 kc from the figure read.

B. The frequency coverage of the RF stage presents certain slight limitation on the coverage. The top frequency limit is about 54 megacycles. The bottom frequency limit is 3.000 Mc. Any ranges between these frequencies can be covered satisfactorily with one exception:

The preselector is such that it cannot tune the full range of 3.000 to 3.550 in one section, although any 250 kc of range can be tuned quite satisfactorily. Therefore, if you desire reception of special frequencies in this range, you will connect the preselector for the segment desired.

C. The frequency of the crystal required is obtained by adding 2.955 Mc to the frequency which you desire as the bottom of the tuning range. Examples: coverage of the range 15.000 - 15.550: Crystal frequency 17.995 Mc. Coverage of 26.900 - 27.450 Mc: Crystal frequency 29.855 Mc.

See section 4-6 for full details on installing extra crystals.

The DR-30 can be supplied with ranges other than the 10 standard ones for amateur reception on a special-order basis. The general requirements above may be used as a guideline in choosing frequencies for these bands. Other receiver models, with such features as UHF coverage and fixed channel (non-tunable) reception are available for commercial users.

3-5. Reception Hints

The National Bureau of Standards station, WWV, broadcasts time, frequency, and radio wave propagation notices throughout the day, offering the operator information that can greatly increase his effectiveness.

With the exception of a four-minute silent period beginning at forty-five minutes past the hour, WWV broadcasts in a repeated five-minute cycle. For the first two minutes of each cycle, you receive a constant modulation of either 440 cycles per second or 600 cycles per second, superimposed on which are ticks exactly one second apart. During the third minute the broadcast is a digital code containing information for professional users. Also in each five-minute cycle the exact Eastern Standard Time is announced, followed by a propagation prediction for the next twelve hours for trans-oceanic paths. The propagation notice consists of the letter n, u, or w ("no warning," "unstable conditions," or "ionospheric disturbance" respectively) and a number between one and nine. The higher numbers indicate more favorable conditions, low numbers more difficult ones.

Thus an operator can ascertain the exact time, his dial calibration, and the predicted conditions simply by tuning WWV at 10.000 Mc. as provided on the DR-30.

A Canadian station, CHU, at 7.335 Mc. announces the time in English and French each minute; between announcements, ticks indicate one-second intervals.

Short-Wave Broadcast Band Reception with the DR-30

The frequencies in the DR-30 include several foreign broadcast bands: the 31 meter band (9.5 to 10.050 Mc.), the 80 and 40 meter bands shared between amateur and broadcast service, and the 15 meter band which gives partial coverage of the SW band that includes 21.400 to 21.750 Mc.

The DR-30 can be equipped with supplementary coverages, as indicated in section 3-4, for other short-wave broadcast bands.

Reception of foreign broadcasts depends upon propagation conditions. As a rule, the lower frequencies are best received at night, the higher frequencies in the daytime.

Programs on the broadcast bands are often very interesting. Details of the stations and programs can be found in Popular Electronics, Electronics Illustrated, and in the World Radio & TV Handbook, published in Denmark and available in the US from Gilfer Associates, P. O. Box 239, Park Ridge, New Jersey, 07656.

The DR-30 receiver is a double-conversion superheterodyne unit with frequency coverage of 12 one-half megacycle bands in the range of 3.5 to 54 megacycles.

Signals from the antenna input J1 pass through the RF GAIN CONTROL and thence to a low-impedance tap on the antenna input coil L1. This high-Q toroidal inductor is tuned by the preselector capacitor to a frequency of approximately 6.5 Mc. to 17 Mc. For frequencies lower than this range, capacitors are connected across the toroid by the bandswitch S1; for higher frequencies, inductors are connected. The RF amplifier, Q1, is a field-effect transistor (Type K1504). The field-effect transistor is characterized by a high operating impedence, and is a voltage-operated device similar to a tube. This voltage-operation allows maximum preselector selectivity, since no compromise between power transfer and Q is necessary as would be the case with normal (bipolar) transistors. In addition, the transfer characteristics of the field-effect transistor approach very closely the theoretical square-law configuration, and performance under conditions which lead to cross-modulation and overloading in other devices is markedly superior. Since the field-effect transistor is a majority-carrier device, the shot-noise noted in bipolar transistors is absent; this field-effect transistor allows extremely low-noise operation even to the UHF region. The output from the RF amplifier is via a tuned circuit similar to the input circuit.

The high frequency conversion oscillator, Q2, is operated in the fundamental mode from crystals up to 18 Mc., and as an overtone oscillator above 18 Mc. using the collector load as a resistor for fundamental operation and a tuned circuit for overtone. A different tunable collector circuit is provided for each overtone crystal range. The first conversion oscillator is fed to an oscillator amplifier, Q4, which provides correct amplitude and impedance matching for the first mixer.

Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. The first mixer is also a field-effect transistor stage, so that the high performance in weak-signal reception and rejection of undesired effects made possible in the RF amplifier are not lessened. The crystal oscillator frequencies on each band are higher than the received signal, and the output range from the mixer is 2.405 to 2.955 Mc. This range is fed to a high-Q tuned circuit tracked to the VFO by one section of the main tuning capacitor, C2. A first IF amplifier, Q4a, follows this circuit.

The VFO, or tuning oscillator, Q9, covers a range of 1.950 - 2.500 Mc. and utilizes a high-Q toroidal inductive element for extreme stability. Note that, because of the choice of xtal frequencies, when the VFO frequency goes "up," the received frequency goes "down". An amplifier-buffer stage (Q10) for the VFO provides isolation for the tuning oscillator, and the voltage supply to the VFO is regulated by a separate zener regulator.

The second mixer combines the VFO and IF and has an output of 455 kc. Tunable IF transformers precede and follow a 455 kc amplifier (Q6), and several fixed-tuned ceramic 455 kc filter-resonators provide additional selectivity.

The output of the 455 kc amplifier is fed to the noise limiter amplifier (Q7) which increases the amplitude and rise time of the noise pulses which reach it. Since the effective selectivity is still rather broad at this point, no significant noise pulse lengthening has taken place, as would be the case if the noise were not eliminated until after the highly selective IF filters. A noise amplifier-detector further processes the noise pulse, providing a pulse output which is used to turn "off" the switching diode gate (D3) for the duration of the noise pulse and this effectively mutes the receiver during this time. Noise pulses are thereby prevented from actuating the AGC circuits or reducing the receiver sensitivity. The ANL level control adjusts the bias on the gating diode and therefore the noise limiter threshold.

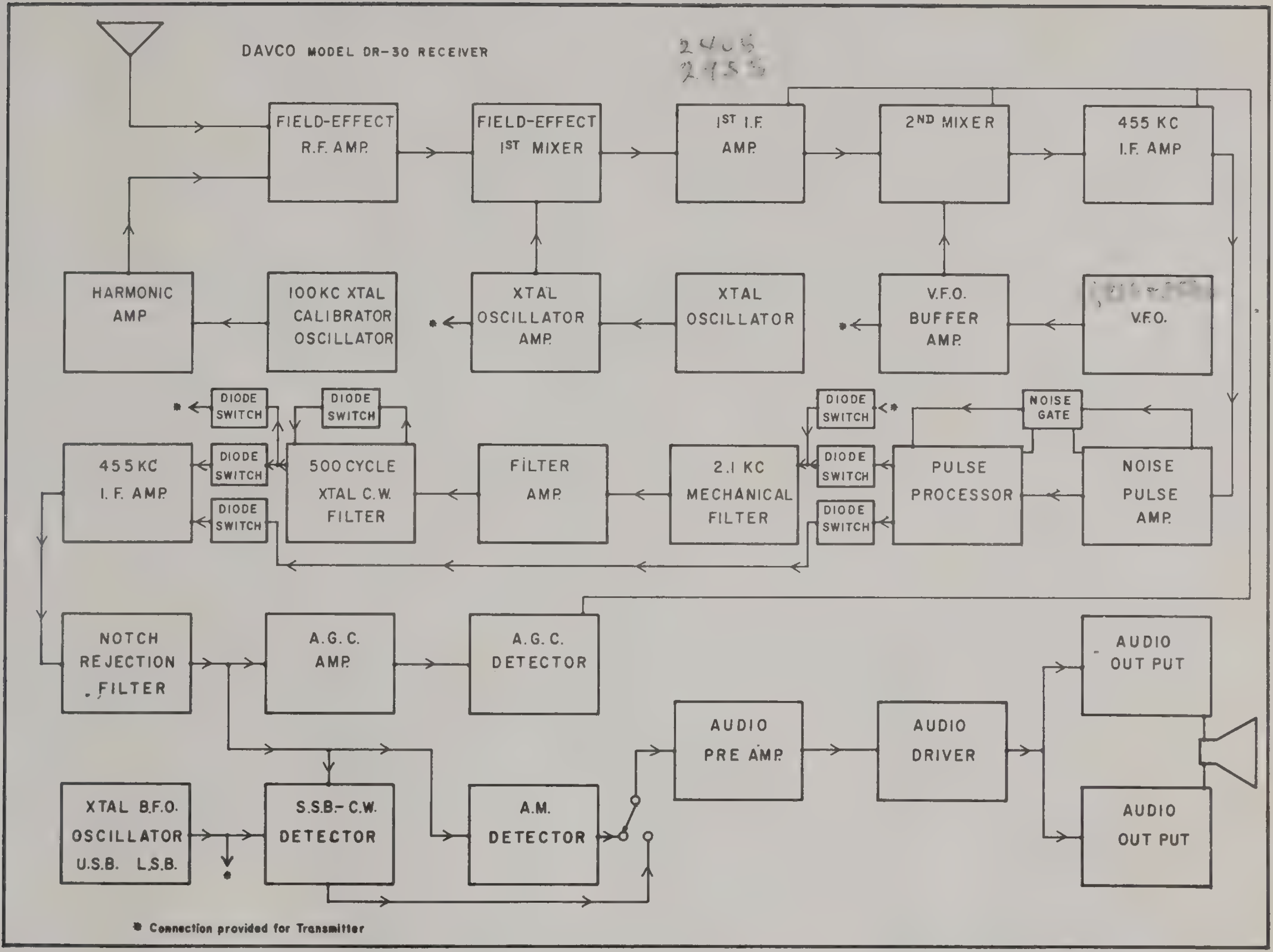
Following the pulse gate several diodes, D4, 5, 7, 8, 10, make up a switching network which changes the signal path to the various selectivity paths; DC biasing is applied to the diodes to turn them on or off as required. The broad selectivity incorporates three ceramic 455 kc filter resonators plus three IF transformers; the 2.1 kc selectivity path uses the Collins mechanical filter, while the narrowest path for CW reception uses a 455 kc xtal filter in series with the mechanical filter. Other switching diodes are used in the circuit for connecting the mechanical filter to the connector jacks on the rear of the receiver for use with a companion transmitter or other units.

One additional 455 kc IF amplifier (Q12) follows the filters, and precedes the rejection notch circuit. A back-panel screwdriver notch depth control is factory pre-set for best results. This notch is tunable across the IF passband and provides up to 60 db rejection of an interfering carrier. Since, like the noise limiter, the notch eliminates the interference before it reaches the AGC circuitry of the receiver, the AGC is not actuated by the interference but only by the desired signal. The receiver is, therefore, operating at the optimum sensitivity for the desired signal, not the QRM-QRN.

Following the notch circuit is the AGC isolation amplifier, Q20, which prevents the AGC detector (Q21) from causing distortion in the other detectors. The AGC detector itself operates in a "bootstrap" arrangement to provide the fast-attact adjustable-hold characteristics which are desired. The output of the AGC amplifier varies with signal strength from full B- to 1 volt negative; this control voltage is fed via a voltage divider to the RF stage, the 1st IF amplifier, the 2nd mixer, and the 1st 455 kc amplifier, and is also sent to the S-meter. Hold action for the AGC is adjusted by changing the RD constant of the hold circuit.

For CW and SSB reception, a crystal BFO-carrier generator signal (Q19), chosen in relation to the passband of the mechanical filter, is injected into the product detector (Q18). A circuit in the VFO shifts the frequency to compensate for the USB and LSB signal-frequency shift. For AM reception, a low-distortion AM detector (Q13) is employed.

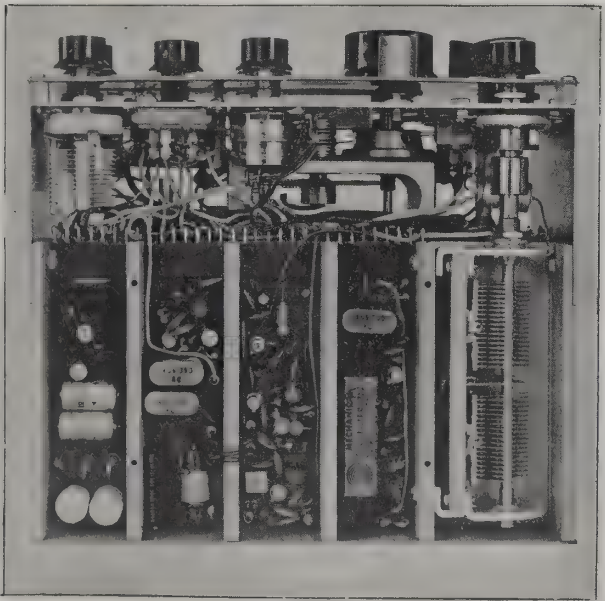
The function switch, in addition to shifting the VFO and the BFO crystals, selects the output of one or the other detectors, feeding it to the audio preamplifier and thence to the AG Gain control. An additional audio preamp and driver stage then provide the signal for the push-pull transformerless audio output circuit which is designed for low distortion and good communications quality.

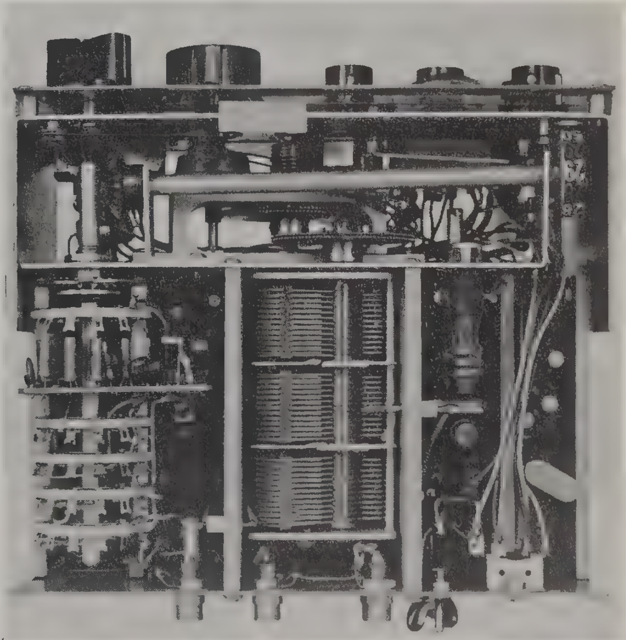


DAVCO MODEL DR-30 RECEIVER

2405
2155

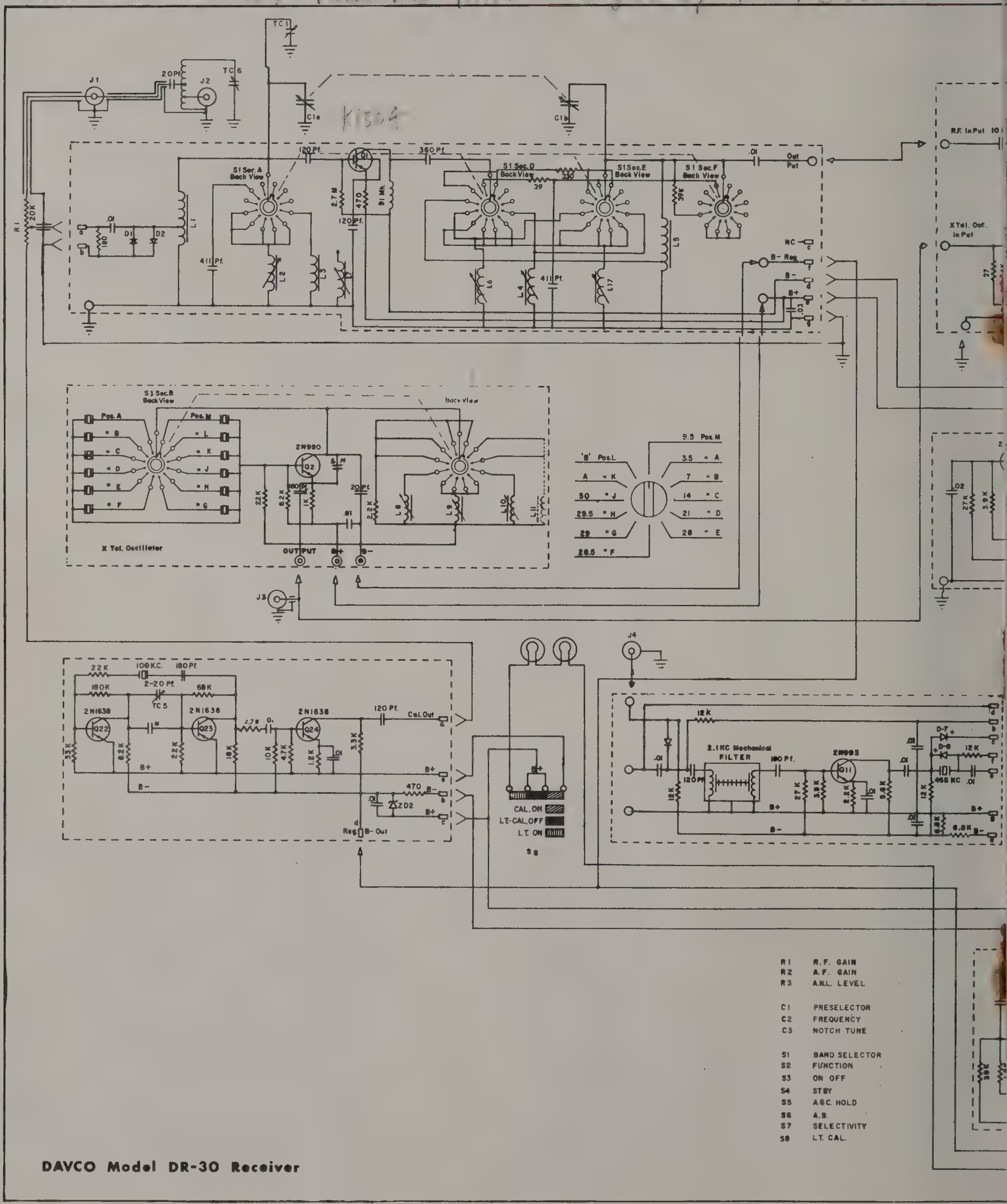
* Connection provided for Transmitter





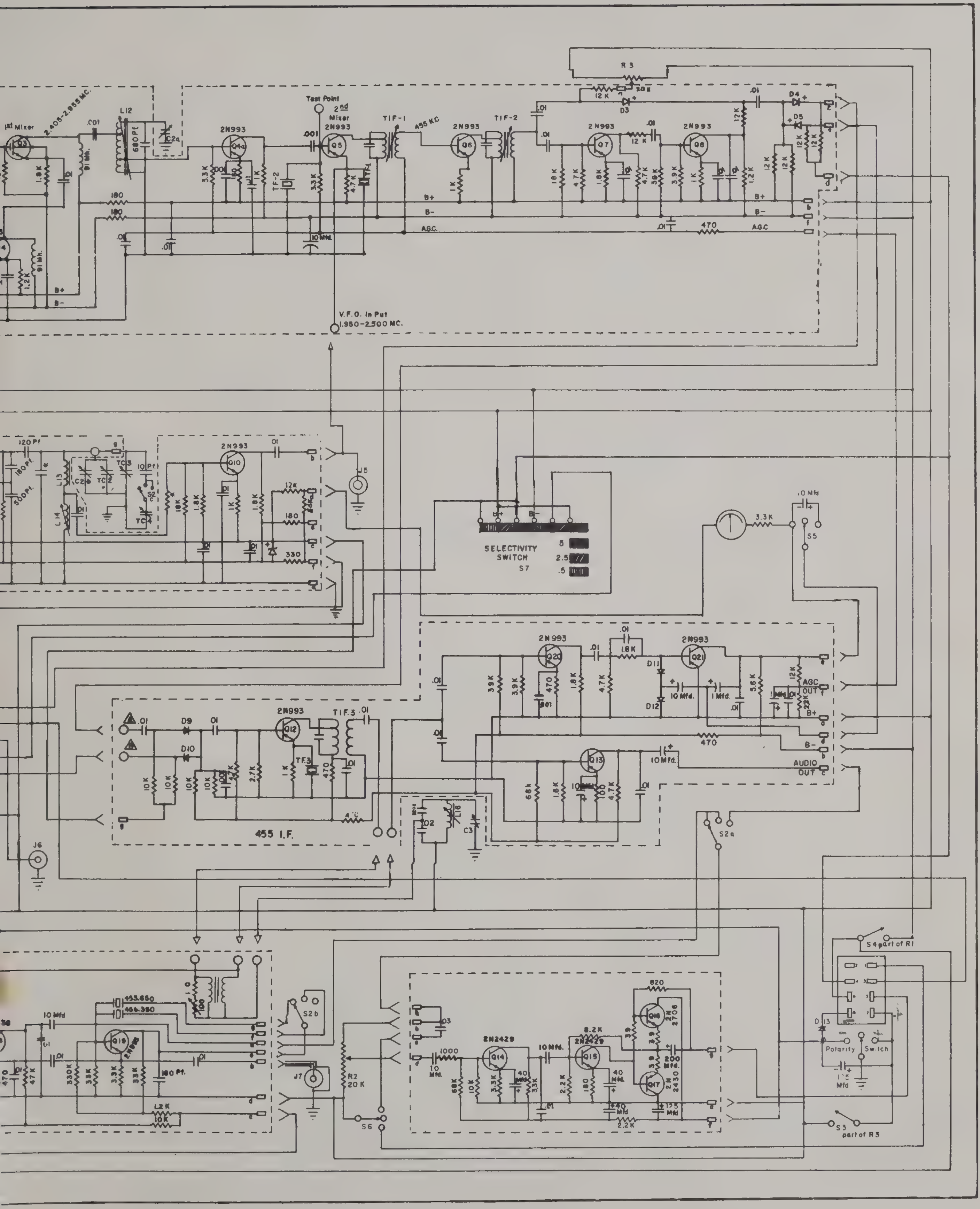
K1504 FET by KMC mfgr. V_{pinch} 8 max at 10 V_{DS}, GM 6.2 MMHO, r_{DS} 700Ω C_{is} 1 pF MOS type

KMC Semicond. Corp Parker Rd. R.D. 2 Long Valley N.J. 07853



R1	R.F. GAIN
R2	A.F. GAIN
R3	A.N.L. LEVEL
C1	PRESELECTOR
C2	FREQUENCY
C3	NOTCH TUNE
S1	BAND SELECTOR
S2	FUNCTION
S3	ON OFF
S4	STBY
S5	A.G.C. HOLD
S6	A.B.
S7	SELECTIVITY
S8	LT. CAL.

DAVCO Model DR-30 Receiver



1st Mixer
2.405-2.955 MC.
L12
680 Pf
C2a
Test Point
2nd Mixer
2N993
Q3
Q4a
Q5
Q6
Q7
Q8
TIF-1
455 KC
TIF-2
TF-2
TF-4
R3
30K
12 K
D3
D4
D5
B+
B-
AGC
470
.01
10 Mfd.
91 Mh.
1.2 K
V.F.O. In Put
1.950-2.500 MC.
120 Pf
180 Pf.
500 Pf.
L13
L14
C2b
TC2
TC3
TC4
10 Pf.
S2
Q10
12K
180
330
J5
SELECTIVITY SWITCH
S7
5
2.5
.5
3.3K
1.0 Mfd
S5
2N993
Q20
Q21
D11
D12
AGC OUT
AUDIO OUT
Q13
68K
10 Mfd.
S2a
D9
D10
Q12
TIF.3
TF.3
455 I.F.
L16
C3
J6
453.650
456.350
Q19
160 Pf.
L2 K
10K
S2b
J7
R2
20 K
S6
2N2429
Q14
Q15
Q16
Q17
2N 2706
2N 2430
820
8.2 K
1000
200 Mfd.
175 Mfd
2.2K
S4 part of R1
D13
Polarity Switch
175 Mfd
S3 part of R3

T-notch

Because of component aging, it may be necessary to re-null the T-notch (notch tune control) circuit every twelve to eighteen months.

Procedure:

Using the wide selectivity position and the BFO in the LSB position, tune in either a strong signal or the calibrator until a high frequency audio tone reads about S9 on the S-meter.

Null the signal with the T-notch control. At the notch you should detect a faint remnant of the carrier; those with sharp ears will notice that the 2nd or 3rd harmonic of the tone predominates over the original pitch. The S-meter should fall back to zero.

If this radical nulling does not occur, slowly and carefully adjust the T-notch pitch control accessible through the small hole in the lower back panel until you achieve a null. The control is a ten-turn potentiometer; you need not use an insulated screwdriver. You should, however, slightly retune the main tuning or the notch tune control to make sure that the signal is in the deepest part of the null while making the adjustment.

Note: Perform the nulling operation only with the receiver installed in its case.

Crystal Calibrator

The 100 kc. crystal calibrator is factory set to match WWV at 10 Mc. Occasionally, component aging may require resetting of the crystal.

Procedure:

Choose a time when WWV is received strongly and consistently. Turn the BFO to the LSB position and zero-beat it with the WWV carrier.

Note: be sure to choose a time when the WWV signal is not modulated with its 440 or 600 cycle modulation. It is very easy to zero-beat with the modulation rather than with the carrier and thus introduce a 440 or 600 cps error in the crystal setting! See section 3-5 for information on WWV.

Turn on the calibrator.

Rotate the RF gain control to the right so that the calibrator signal is received. If the crystal is correctly adjusted, you will be in zero-beat; if not, you will hear a low frequency tone.

Adjust the crystal oscillator to zero-beat by turning the small trimmer capacitor which projects through the gromet in the lower right portion of the back panel. This is a fine adjustment.

If a larger adjustment is required, remove the case from the receiver and make the rough adjustment by turning the white trimmer capacitor on the calibrator board, CT9. Reinstall the case and make the final adjustment with the case on.

Notch Center Frequency

The notch center frequency will rarely require adjustment. Although removal of the case will slightly change the frequency at which the null appears, the change should not affect operation.

Procedure:

If it is necessary to reset the center frequency, use a TV or radio alignment tool (small hex type) to adjust the slug in the variable T-notch inductor, L16.

With the BFO in the LSB position, tune in a strong carrier until a low audio frequency can be heard.

Set the Notch Tune Control at about the 11 o'clock position.

Adjust the slug until the signal is nulled.

SB Shift

The VFO frequency is shifted when the function switch is changed from the USB to the LSB position. Therefore, insofar as possible, the carrier remains at the same calibration.

Procedure:

To check the SB shift, tune in a strong carrier from the calibrator. Set the BFO to the LSB position and zero-beat the signal. Turn the Function switch to the USB position. Any difference in the audio tone indicates a slight SB shift error.

For maximum accuracy, adjust the SB shift with the VFO set in the most frequently used portion of the band. The factory alignment uses .8 Mc. on the tuning dial.

The trimmer capacitor, TC4, is switched into the circuit in the USB position. Zero-beat the carrier again in the LSB position. Switch to the USB position and adjust TC4 until the carrier is again zero-beat.

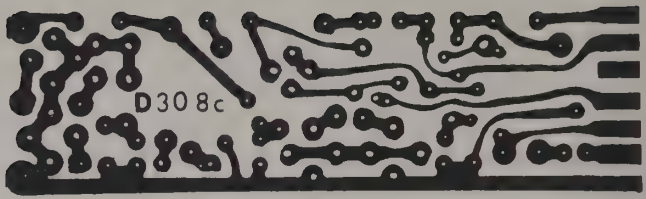
Further Routine Maintenance

Every twelve to eighteen months, apply a very small amount of a thick, silicon-base grease, such as Pfleuger Reel-lube, to the small pinion gear where it engages the large tuning gear. Use the smallest possible amount and apply it with a matchstick or a toothpick. If the receiver has been exposed to a great deal of dirt or dust, first clean the gears with a solvent such as the spray coolant sold in electronics shops for freezing components. Simply remove the old grease and any dirt that may be mixed with it. Then apply the new lubrication.

4-6. Extra Crystal Installation

This Section revised January, 1967
See Addendum A

4-7. RF Module



The RF module contains the RF amplifier FET, Q1, its biasing circuitry, and tuned circuit elements.

Q1 the RF amplifier transistor, is an IGFET, P-channel, low-noise UHF device, employed in a common-source configuration. The transistor is not controlled by the AGC but instead is biased at the most desirable point for eliminating cross-modulation.

Also on the board are the protective diodes, D1 and D2, which ground out any excessive RF voltages applied to the receiver.

The bandswitch wired to the RF module switches in the appropriate inductors or capacitors for coverage of the various frequencies provided in the receiver.

Service Notes:

The bandswitch and RF board are wired together. Removal of the pair of assemblies is quite simple if the folfollowing step-by-step instructions are followed.

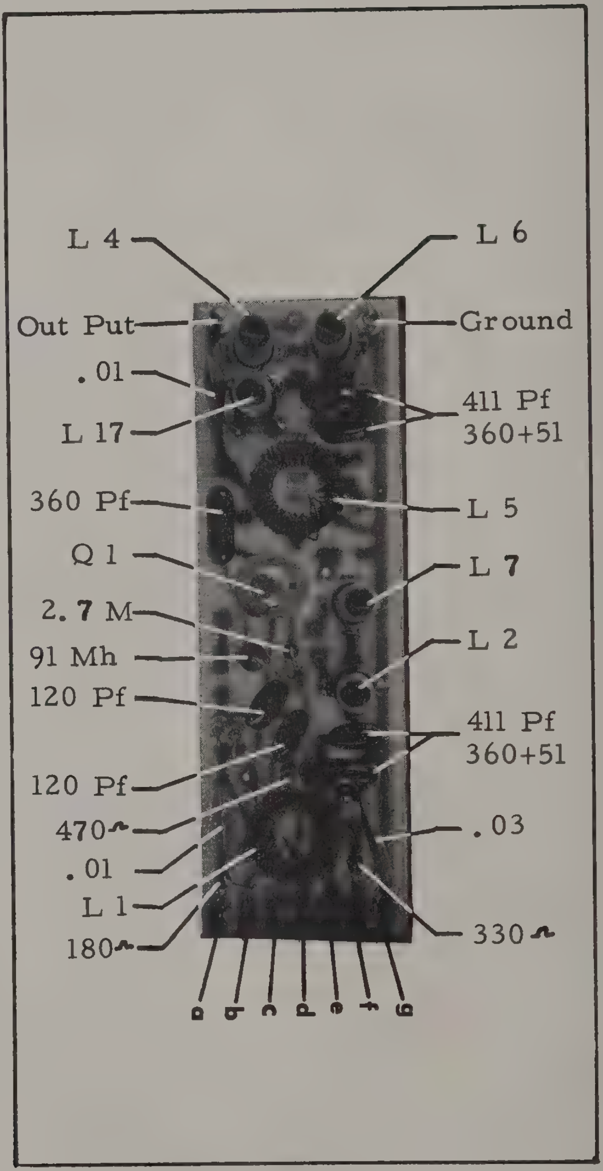
(1) Remove the back panel by removing the six screws and the two bolts holding the Jones plug. Unsolder the Connector wire from the Teflon feedthrough to the XTAL OUT jack.

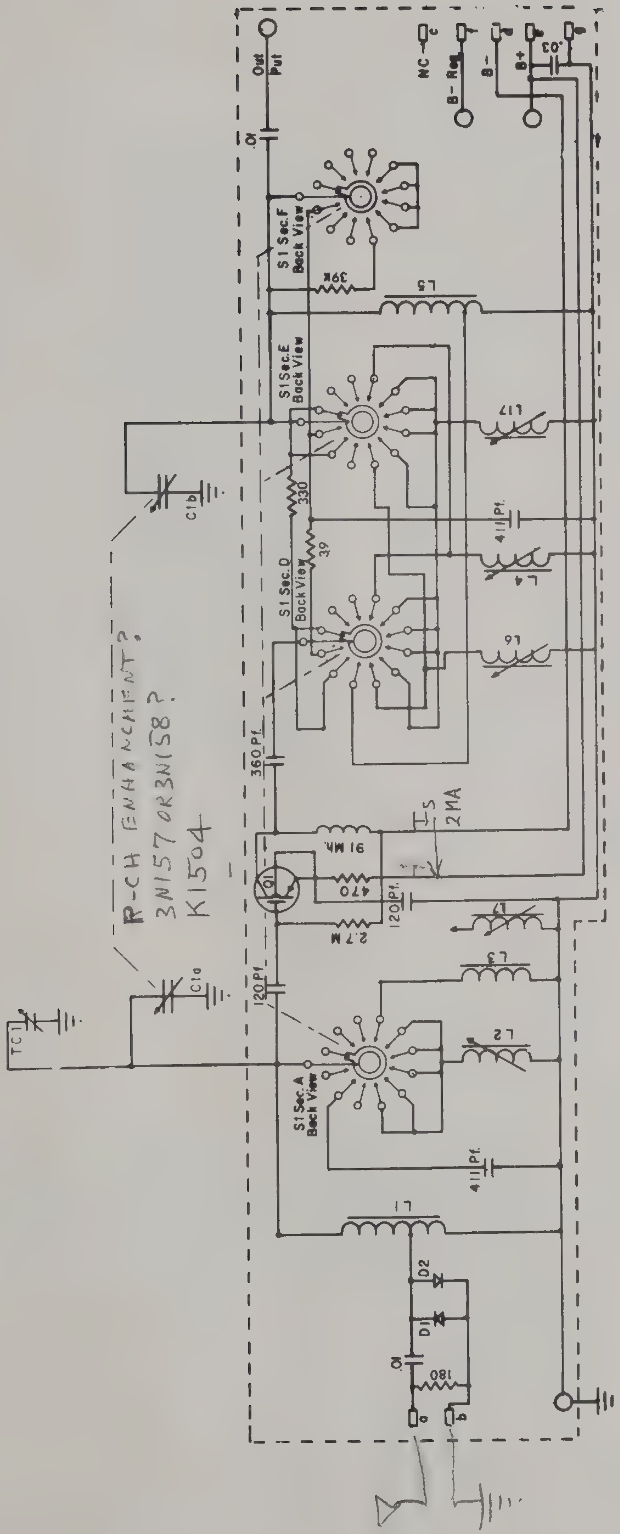
(2) Allow the panel to swing down out of the way with the coax cables holding it near the receiver.

(3) Loosen the setscrew for the mitre gear on the bandswitch shaft; also loosen the large nut holding the bandswitch to the bracket. Remove the bandswitch knob

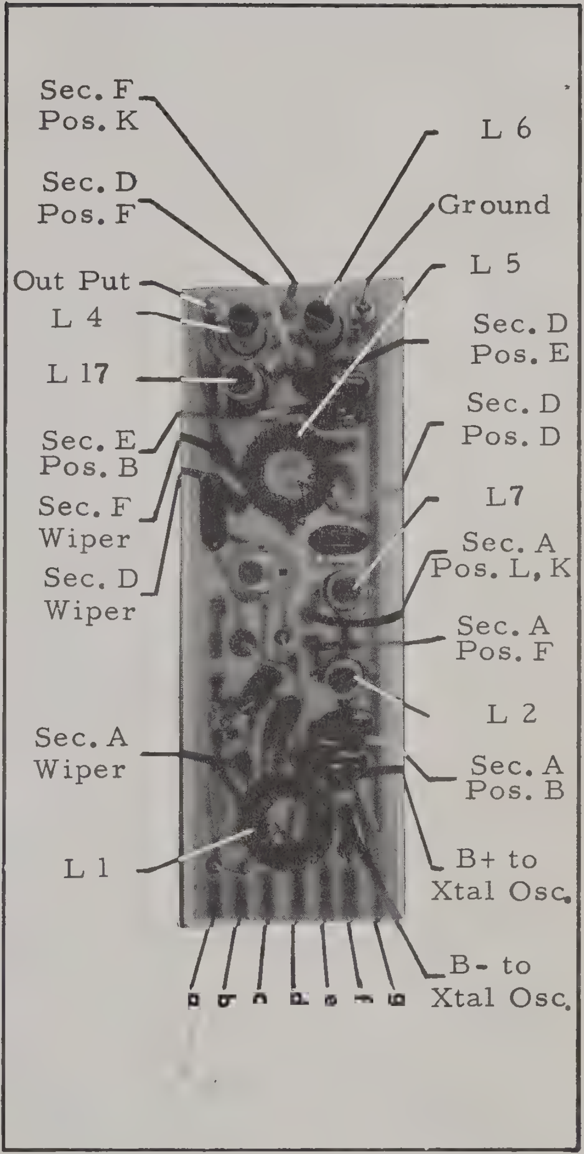
(4) Unsolder the brown wires coming through the chassis from the preselector capacitor; unsolder the yellow wire from the crystal oscillator to the Teflon feedthrough; unsolder the jumper from the end of the RF board to the end of the first IF board.

(5) Slide the assembly out.





R-CH ENHANCMENT?
3N157 OR 3N158?
K1504



R.F. BOARD

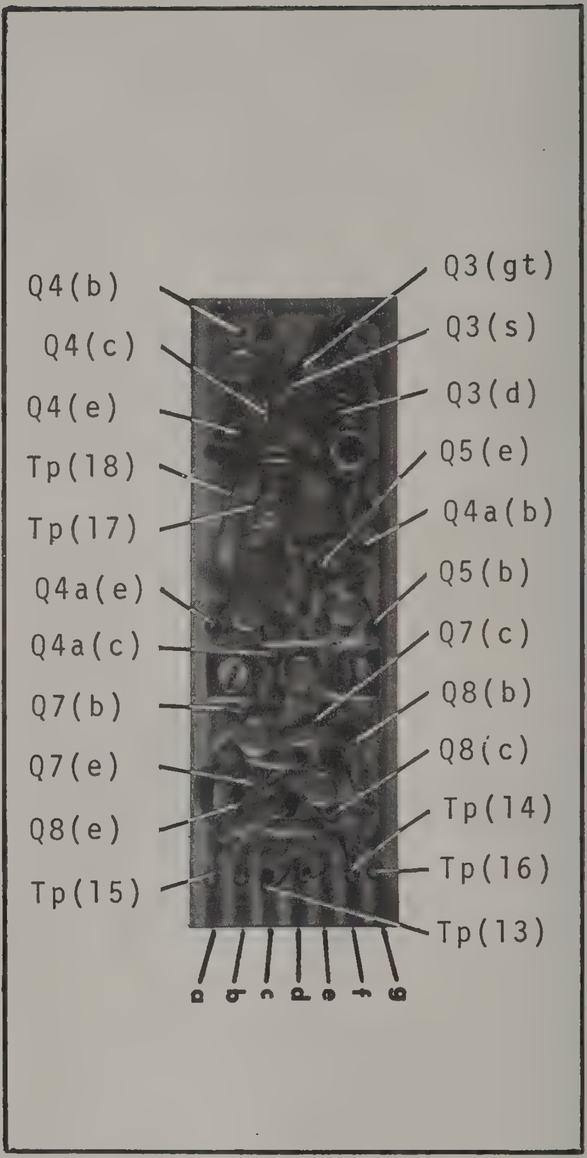
4-8. First IF Module

The first IF module contains 5 transistors and one FET, comprising the mixers, the noise blanker, and other circircuitry.

The first mixer, Q3, is an N-channel insulated-gate field effect device. The use of the FET for a mixer provides lowest possible cross-modulation along with an extremely low noise figure and high conversion gain. The input impedance of the mixer is very high, around 1 megohm. The output of the mixer is at the first intermediate frequency range, 2.405 to 2.955 Mc., and is fed to a high-Q selective circuit which is tuned and tracked by one section of the main tuning capacitor. The signal at the first IF is amplified by Q4a and goes to the second mixer.

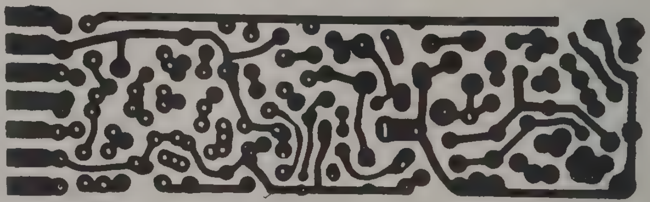
The second mixer, Q5, has in its base circuit a ceramic filter, TF2, which traps any 455 component present at that point. In the emitter circuit another ceramic filter, TF1, provides high gain for the mixer at 455 kc and helps establish the IF passband. Q6 is a normal 455 kc. IF amplifier and TIF1 and TIF2 are single-tuned IF transformers.

The noise blanker employs two stages of amplification and wave-shaping, Q7 and Q8, which speed up, amplify, and detect the noise pulses entering the receiver. The resulting voltage is fed to the diode gate, D3, which is in series with the IF string. A noise pulse can therefore turn off the gate for the duration of the noise, allowing signals to pass unaltered. The level at which the noise blanking occurs is controlled by the setting of the ANL level control, R3. Under normal operating conditions, the control remains so that the diode is fully on. D4 and D5 are selectivity path switching diodes which are turned on or off by dc bias provided at the selectivity switch, S7.



Service Notes:

This board can be checked almost entirely through dc voltage measurements and the use of a 455 kc. signal generator. An important dc point is the AGC voltage at the test point, the base of Q5. Any variation from normal may mean a shorted transistor (Q4a, Q5, or Q6), a grounded coax from the VFO connector to the emitter of Q5, or a malfunctioning AGC detector (Q21 on the 455 module).

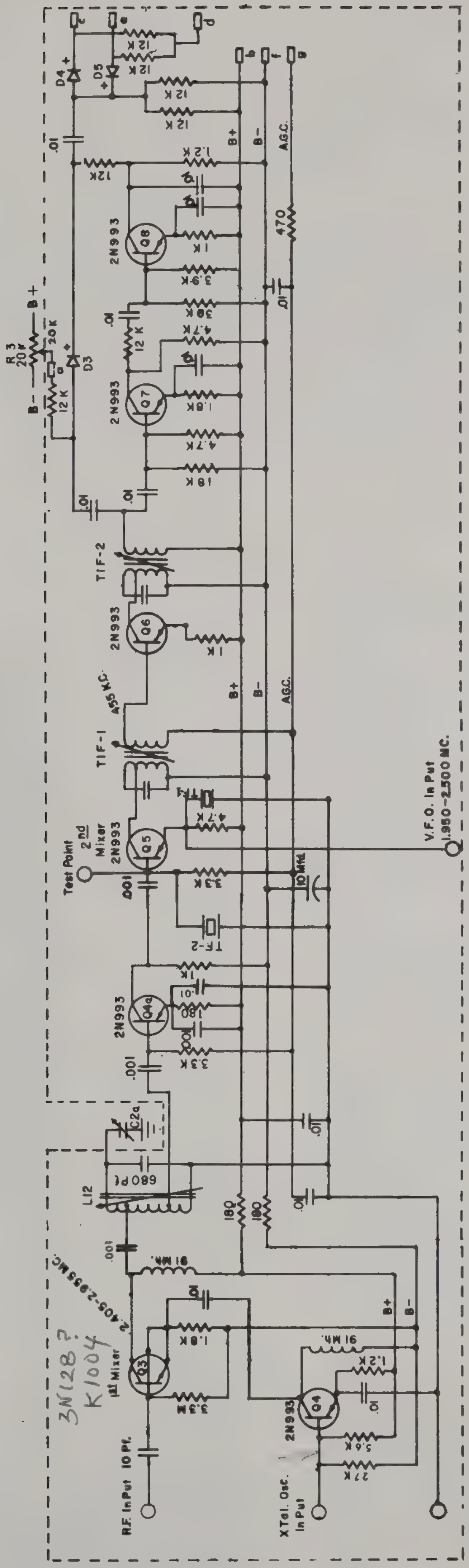


Signal tracing with a 455 kc. generator should begin at the same test point. CAUTION: Use a small capacitor (.01 mfd) to DC block any signal generator probe before using it. A very low level of signal is required at this point; around 30 microvolts is adequate.

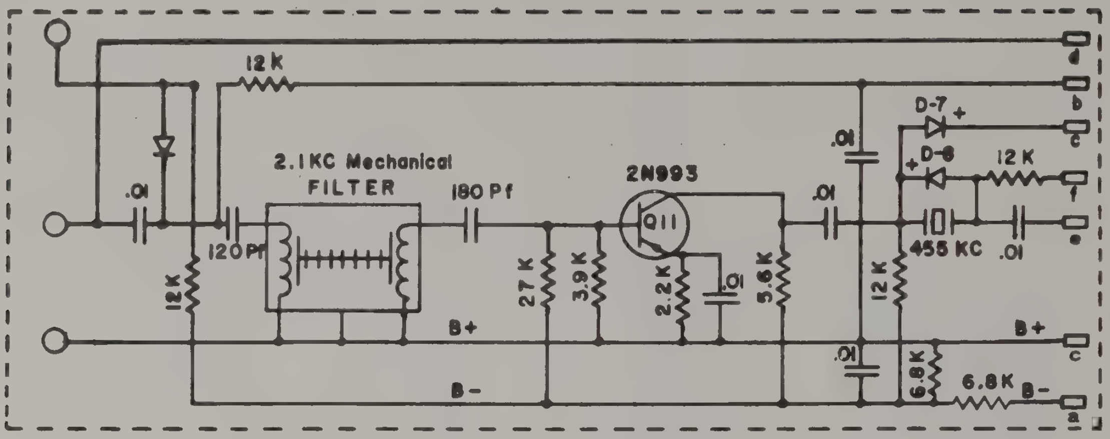
Further injection points are the base of Q7 and pin c or e on the wiring harness.

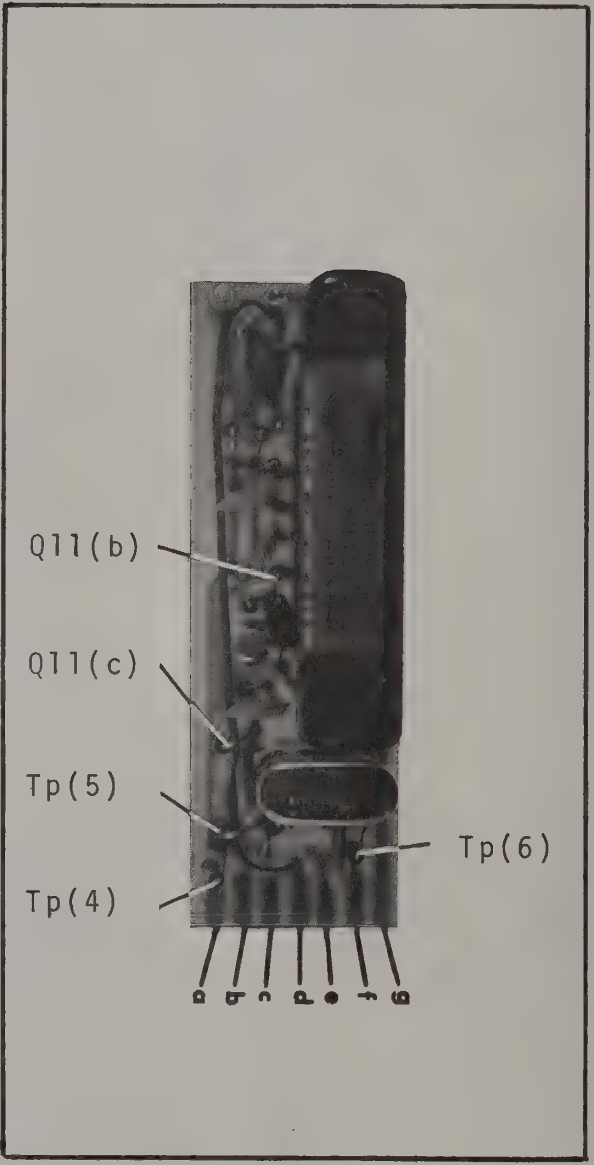
Injection of signal at the first intermediate frequency may also be done at the test point, at the connection from the first IF to the main tuning capacitor (at the Teflon feedthrough on the chassis), at the input to the first mixer, and at the Teflon feedthrough connection for the oscillator.

4-8. First IF Module



4-9. Mechanical Filter Module





The circuitry on this module provides two narrow filter selectivities: a Collins 2.1 kc mechanical filter and a narrow crystal filter designed expressly for CW reception.

The diodes D6, D7, and D8 are employed in signal-switching circuitry which, by application of different DC bias voltages from the selectivity switch, route the signal through or around the filters. Q11 is a common-emitter amplifier stage whose amplification is adjusted so that each selectivity path has the same gain.

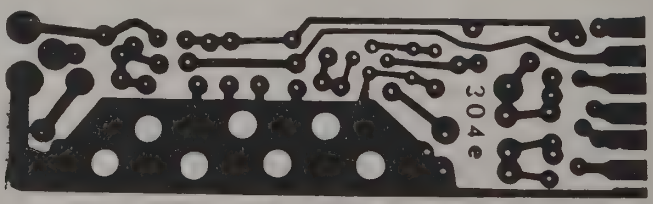
Additional connections are provided through the diode switches for operation of external equipment. Note that for correct receiver operation, a jumper must be placed from pin 3 to pin 4 on the rear-panel Jones plug.

Service Notes:

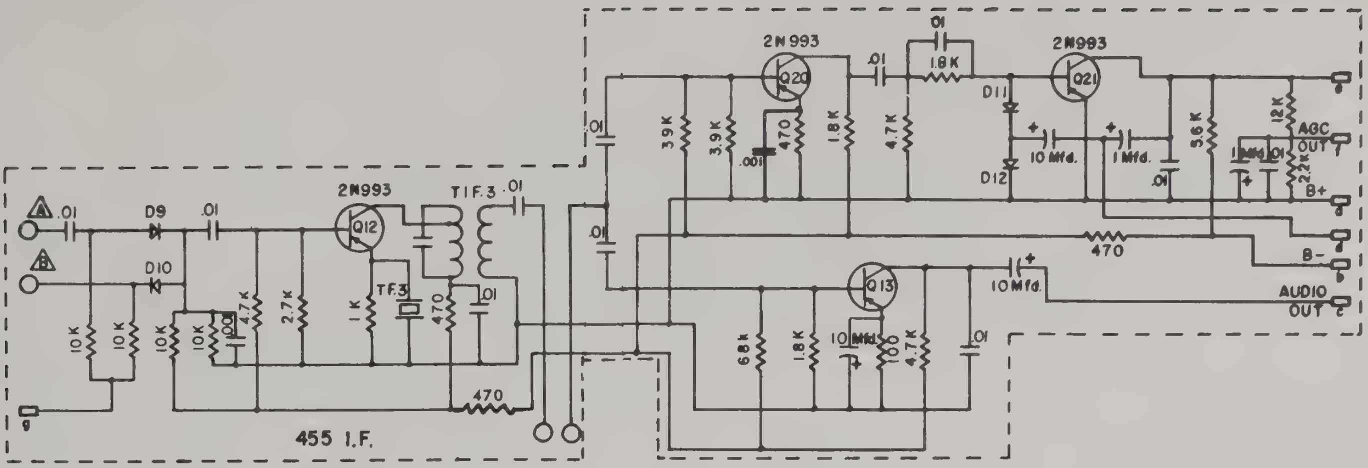
A low frequency crystal or the Collins mechanical filter may fail from excessive physical shock. If this failure occurs, it will be difficult to pass any signal at all through the narrow IF selectivity.

If the gain is low and the board "rattles" when shaken after removal from the set, you should suspect failure of one of these components. For a simple test, inject a 455 kc. signal generator at harness connection D and tune through the range while switching from one path to another.

If gain is low but the bandpass is correct, check all voltages on the board, particularly those of the transistor connections. Also check the switching diode circuitry of the 455 module to be sure that the failure is not in that circuitry rather than on the filter module.



4-10. Second IF Module



This subassembly contains four stages. Q12 is a tuned 455 kc IF amplifier. TF3 is a ceramic transfilter employed as an emitter bypass.

Q13 is the low-distortion AM detector.

Q20 is a buffer and amplifier for the AGC system of the receiver. This stage is operated at a low gain level by use of a small emitter bypass capacitor which reduces the stage gain and raises the input impedance of the stage. The function of the stage is to isolate the AGC detector from the other detectors so that the AGC detector cannot reflect distortion into the other detectors.

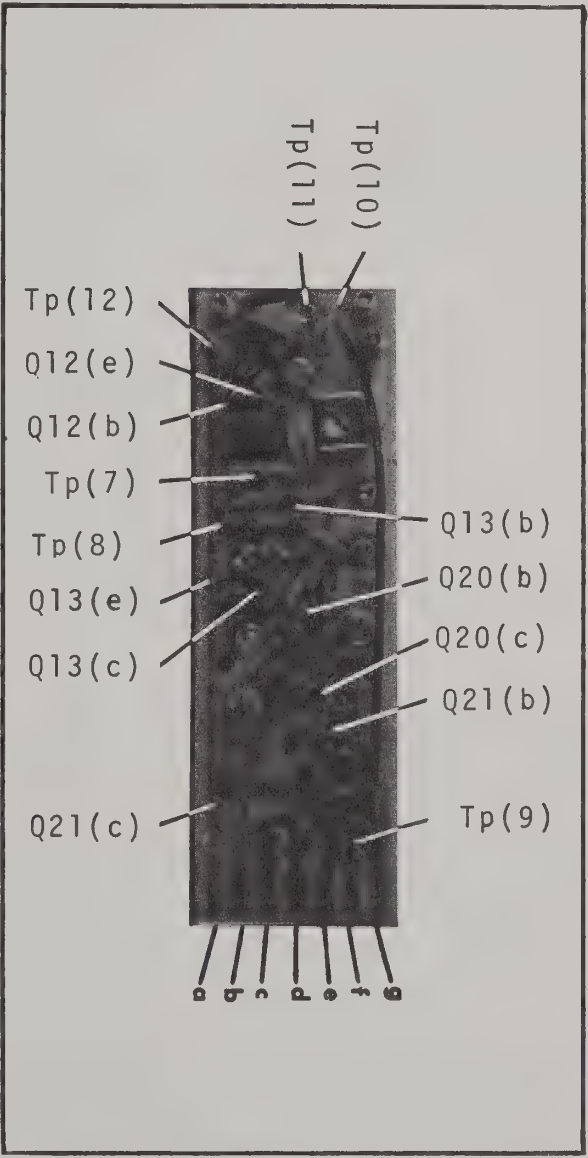
Q21 is the AGC detector. This stage is designed so that the 455 kc input is detected and the collector current increases with an increase in the signal level applied to a transistor. The increasing current causes a voltage drop across the collector resistor network; the result is a positive-going voltage with increasing signal. The collector of Q21 swings from about 11 volts to 1 volt with changing signal levels. This voltage is applied to the S-meter and is also fed to a voltage divider which gives an approximate 9:1 reduction in the output voltage swing. The divided voltage is fed to several IF stages as the control voltage.

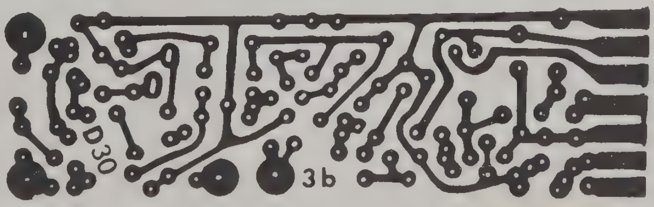
The AGC detector has fast-attack characteristics at all times. The speed with which voltage returns to the no-signal level after removal of the signal depends upon the time-constand of a feedback loop from the collector to the base of Q21. D11, D12, the base resistors, and the electrolytic capacitors of the hold circuits establish this time-constant. Three positions of hold time are provided and are chosen by means of the AGC HOLD toggle switch on the front panel. The three choices given are (1) 10 mfd capacitor only for long hold (right position), (2) two 10 mfd capacitors in series, for an approximate 5 mfd, for medium hold (left position), and (3) the 1 mfd capacitor only for short hold time (center position).

The other capacitors and resistors associated with the voltage divider and Q21 are filters which remove the IF component from the dc voltage fed back to the earlier stages.

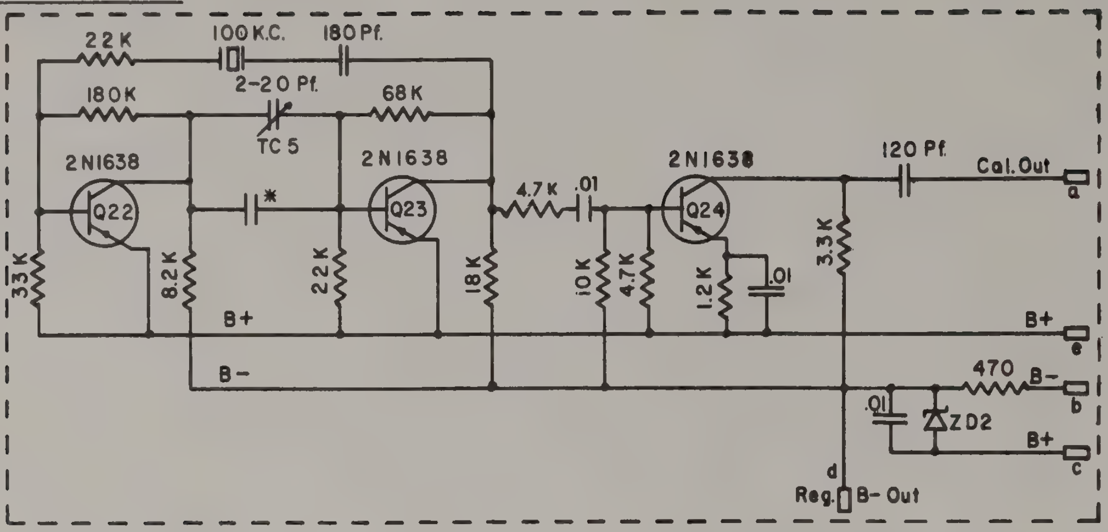
Service Notes:

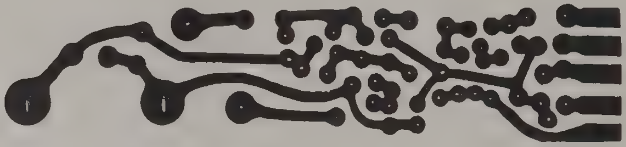
The AGC detector output should not be shorted to the chassis or to any other connections at the board, at the S-meter, at the AGC hold switch, or at any other point. Doing so can cause failure of Q21; the cure is replacement of the transistor. Normal precautions should be taken to prevent such short circuits.





4-11. Calibrator Module





The crystal calibrator circuit is an amplifier feedback type of oscillator in which the feedback path is from the collector of Q23 to the base of Q22 through the crystal. The impedance of the crystal at series resonance is low enough to permit feedback of sufficient amplitude to start and maintain oscillations. The 22,000 ohm resistor limits the power dissipated in the crystal to well below its rated maximum.

Q24 is a high-gain untuned amplifier stage which raises the output level of the crystal oscillator while also clipping the waveform to a highly distorted, harmonic-rich wave shape. Useful harmonics are provided for receiver calibration at the receiver's highest frequencies.

ZD2 is a 6.8 volt zener regulator diode. The voltage from this zener diode is fed to the calibrator circuit and also to the BFO board and the first conversion (crystal) oscillator board. The calibrator is switched off and on by connecting the plus side of the power to the board, i.e., the minus side is always "on" so that the zener diode is used.

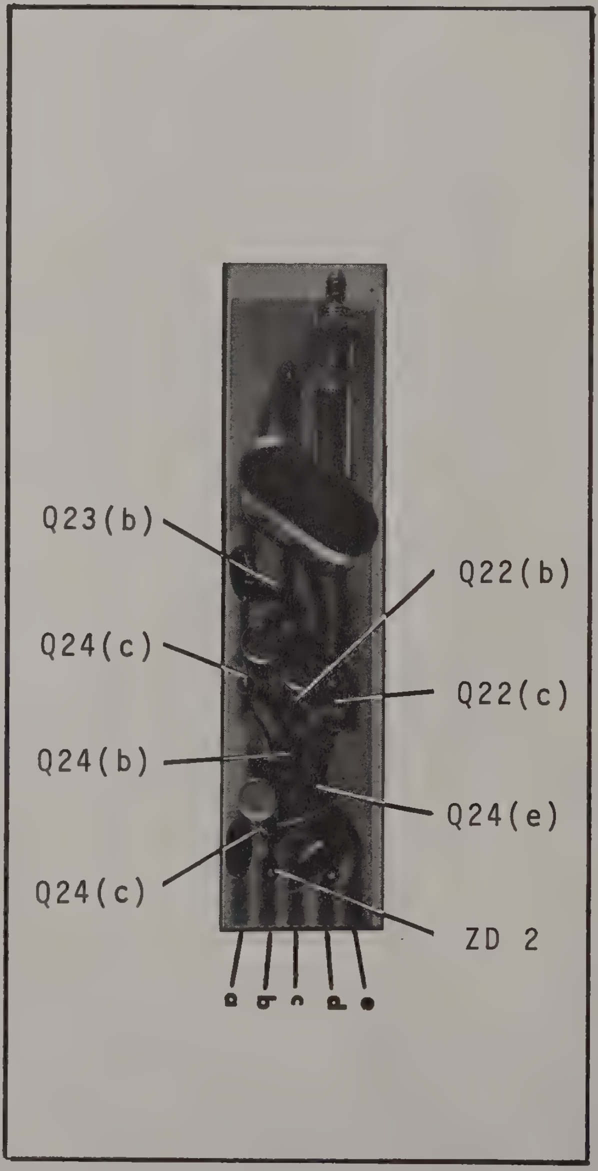
Service Notes:

This circuit is quite trouble-free, and voltage measurements on the transistor connections will usually locate any difficulty. If all voltages are essentially correct, replace the crystal or the board.

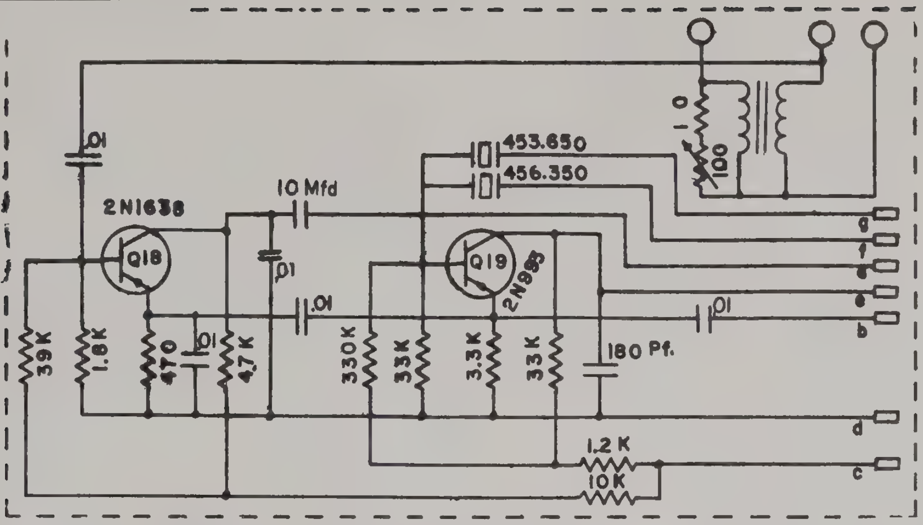
The zener can fail only if an extreme current load is placed on it, for instance, if the regulated line to one of the boards should be shorted accidentally. Take precautions that such shorts do not occur.

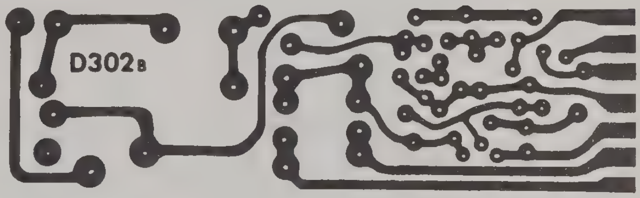
If the zener should fail, the receiver will react as though it were completely inoperative. The zener can be replaced with any suitable type of 1/4 watt or higher.

Since the zener tends to short out, rather than opening, when failing, it may be possible to make an emergency repair simply by clipping the zener lead at the component. This action will provide unregulated voltage to the oscillators and will affect stability. Therefore, the zener should be replaced as soon as possible.



4-12. BFO Module



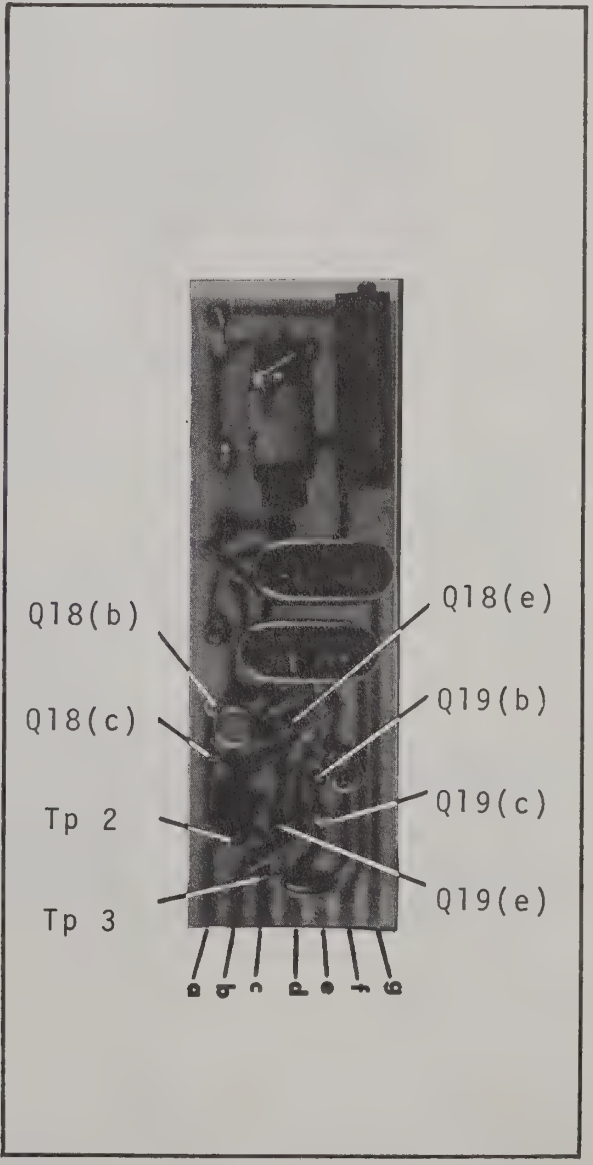


The BFO module contains the crystal-controlled BFO/carrier generator, the product detector used for SSB and CW reception, and certain components of the rejection-notch circuit.

Q19 is the crystal oscillator transistor. Crystals of 453.650 kc. and 456.350 kc. are employed for LSB and USB reception respectively. The crystals are chosen by the function switch S2. The output of this oscillator is fed to the rear connection jack BFO OUT for use with external equipment and also goes to the product detector Q18.

Also on this module is the mutual inductor L which is a portion of the T-notch, and the notch depth control, a 100 ohm ten-turn potentiometer.

Power for operation of this module is derived from the regulated line originating at the zener diode on the calibrator module, assuring that the frequency will be stable with varying input voltages and that the amplitude of the crystal oscillator signal will remain constant. This latter point is of special importance when the BFO is used as a carrier generator feeding a balanced modulator for transmission, as it is possible for changing oscillator signals to unbalance such mixers.



Service Notes:

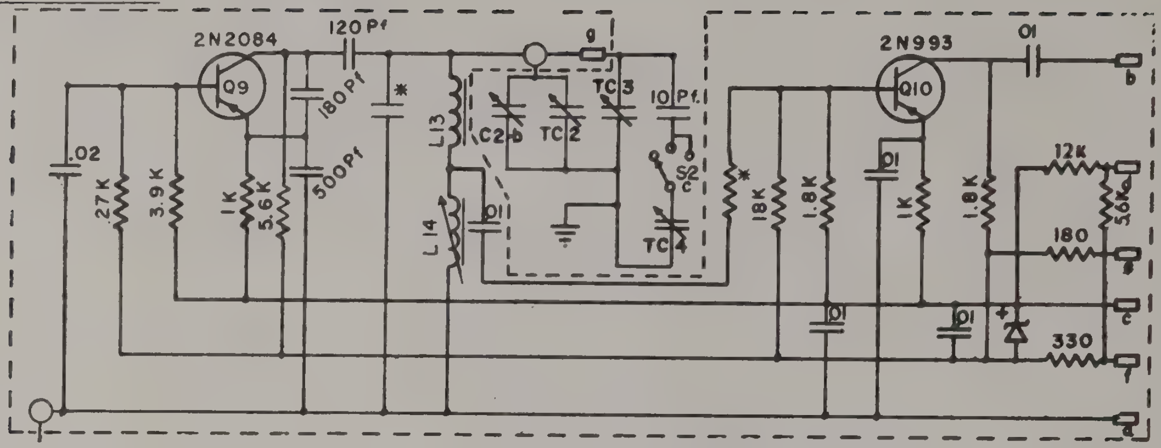
Any low-frequency crystal is subject to damage from extreme physical shock. The only remedy is replacement of the crystal.

If the BFO fails, the audio heard from the receiver will sound similar to that received when the function switch is in the AM position. There will, however, be some distortion and loss of output. Should both the LSB and the USB positions fail, check the crystal and the connections to the function switch by shorting across pins e and g for the LSB crystal or pins e and f for the USB crystal.

Caution: Be careful in unsoldering the connections to the terminals from the 455 board. The wires are Teflon insulated and cannot be damaged by overheating. However, the T-notch coil is near by and can be damaged if touched with a hot soldering iron.

If the T-notch is damaged, an emergency repair can be made by shorting out the T-notch circuit and jumpering the solder lugs together. Some reduction of gain will occur but may be partially compensated by returning the IF transformer, T1F3.

4-15. VFO Module



The VFO module contains the highly-stable variable oscillator used for the second frequency conversion of the DR-30 and an isolation amplifier for the oscillator. The tuning oscillator is also suitable for use as a transmitter frequency-control VFO.

Q9 is employed as the tuning oscillator in a common-base circuit. Feedback is applied from the collector to the emitter through the voltage divider, consisting of the two dipped-mica capacitors. The inductive element for the VFO circuit consists of L13, a high-Q toroidal inductor, and L14, a small tunable inductor which is connected on the low-impedance end of the toroid. The output of the oscillator is taken from the junction of these inductors and in effect provides a low-impedance tap on the tuned circuit.

Transistor Q10 is used as a buffer-amplifier for the VFO. This stage isolates the tuning oscillator from strong signals and establishes the correct injection voltage for the second mixer, Q5.

ZD1 is a zener diode which provides a 6.8 volt regulated supply for the VFO and buffer circuits despite variations in input voltage to the receiver.

The bridge network across pin d of the board provides the correct voltage for the S-meter with no signal. The voltage is approximately the same as that present at the collector of the AGC detector Q21 when no signal is present.

Service Notes:

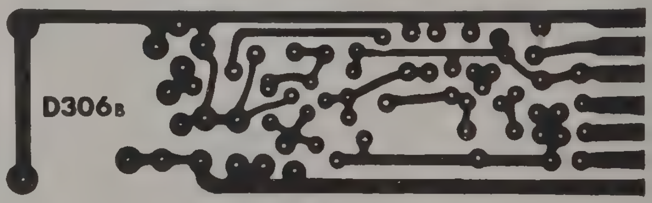
The output of ZD1, the voltage regulator, must not be shorted to the chassis or to the power supply lines of the receiver. Such shorts can cause breakdown of the diode. In such a case, emergency repairs can often be made by clipping one lead of the diode and thus restoring voltage to the VFO. Note, however, that the voltage stability of the receiver will be very badly affected and that the zener should be replaced as soon as possible.

Be especially careful when adjusting TC4, the SB shift trimmer capacitor. Always perform this operation with the rear-panel chassis polarity switch in the POSITIVE GROUND position to prevent damage if your tuning tool should accidentally touch the zener lead while also touching the capacitor.

The VFO output is present at the rear-panel jack and can be monitored with an oscilloscope. Normal output level is 50 mv. Caution: dc block with a capacitor any connections made to this jack. Failure to do so may cause malfunction of the 2nd mixer, Q5.

Lack of VFO output can be caused either by a failure of Q9, which is unlikely, or by shorting the main tuning capacitor. Voltage measurements on the board should establish whether the transistor is operating properly. Voltage measurements will vary slightly with no oscillation, but this variation does not suggest transistor failure but rather oscillation failure resulting from capacitor short-circuiting.

Caution: Shorting of Q5 may create the symptom of no output from the VFO OUT jack on the rear panel. Disconnect the coax to Q5 and recheck before concluding that the VFO, and not the mixer, is malfunctioning.



4-14. VFO Calibration

Original calibration or recalibration of the tuning oscillator of the VFO is a simple operation for anyone familiar with alignment procedures.

Three variables must be adjusted correctly for calibration:

(1) The "fixed" capacity of the circuit must be correct.
(2) The inductance of the circuit must be correct.
(3) The correct portion of the tuning capacitor's rotation must be used.

(1) Two trimmer capacitors are provided for adjustment of the "fixed" capacity of the circuit. The internal trimmer TC2 is used for rough adjustment; the panel calibrator TC3 is used for the final touchup. Observe the following precautions:

(a) Do not screw in the adjustment screws more than flush with the capacitor body. The flush position is the position of maximum capacity. Further insertion of the screw may cause it to fall out the other side.

(b) Be sure to use the internal capacitor in such a way that, after final adjustment, the external trimmer will not project so far out on the front panel as to interfere with the action of the function switch.

(2) The inductance of the circuit is roughly adjusted by moving the turns of wire on the VFO toroid. After rough adjustment the toroid is locked firmly by an application of Q-dope. Further adjustment is made by the tunable inductor located next to the toroid. The tunable inductor should be set in mid-range before the toroid is adjusted so that suitable adjustment in either direction is possible.

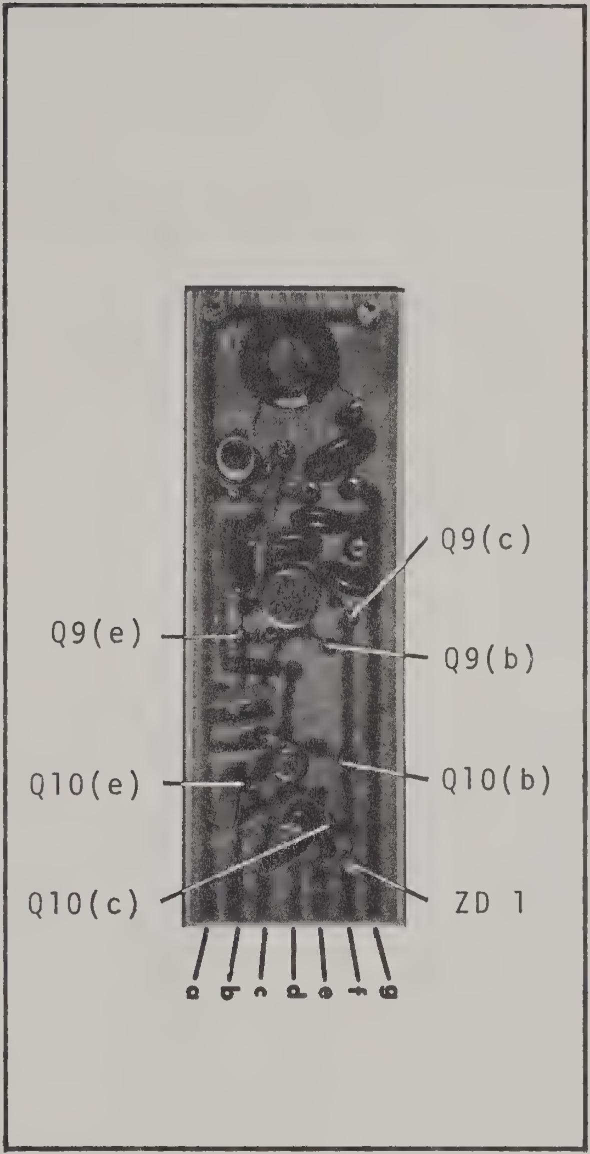
Which portion of the tuning capacitor is employed depends upon the relationship of the capacitor to the dial pointer. To establish which portion is to be used, set the dial at the top calibration point (.550 or 1.050), loosen the allen setscrew which holds the capacitor split gear, set the capacitor, and retighten the setscrew.

Alignment Procedure

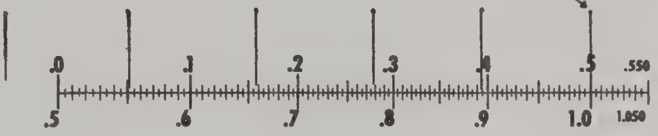
Make sure that the crystal calibrator is set exactly on the carrier of WWV at 10 Mc. Adjust the trimmer capacitors and inductors until the pointer is exactly on 10 Mc. when the WWV signal is zero-beat with the BFO in the LSB position.

Turn the RF gain control to the right so that the calibrator is audible. The calibrator will provide signals at 100 kc. intervals. The alignment procedure consists of assuring that these signals coincide with the 100 kc. marks on the dial.

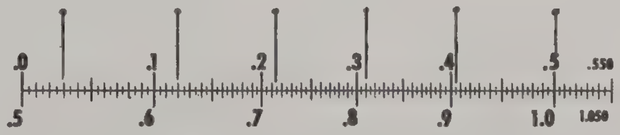
Follow standard alignment techniques. To increase the frequency coverage of the capacitor for a given dial pointer coverage, decrease the "fixed" capacity by adjusting TC2 and TC3. After making any change in capacitance, always return to the 1.000 Mc. mark at the top of the dial and correct the inductance so that the 100 kc. signal appears at the correct spot on the dial. See the chart below.



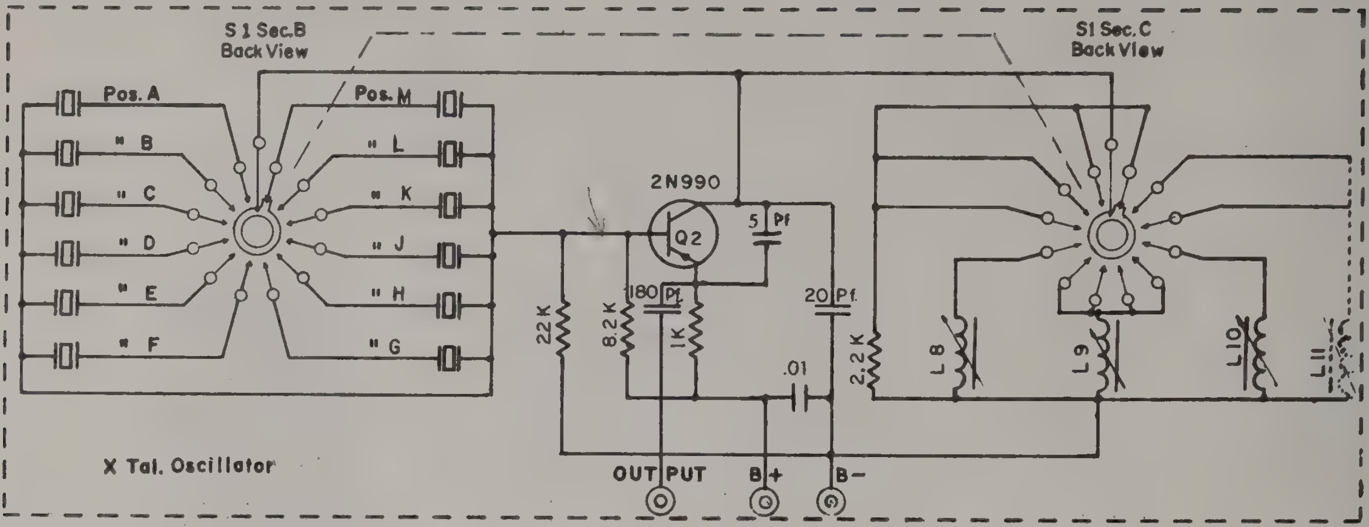
Pointer at Calibrator Zero Beat

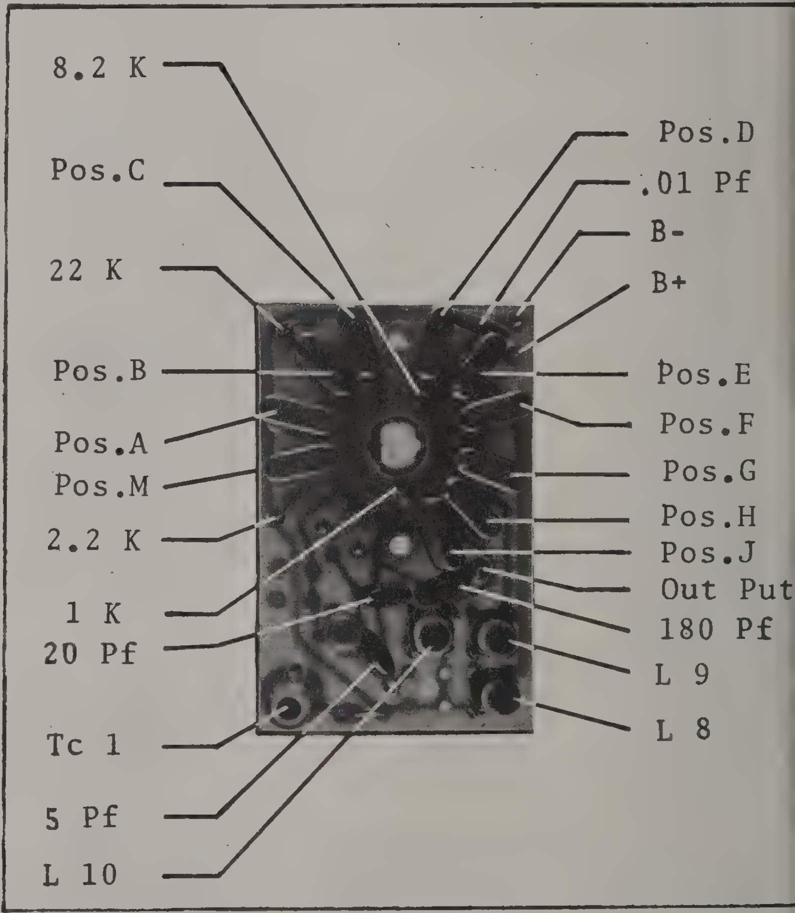


Decrease trim capacitors (Tc2, Tc3)
Increase Inductor (L 14)



Increase trim capacitors (Tc2, Tc3)
Decrease Inductor (L 14)





CRYSTAL OSCILLATOR MODULE

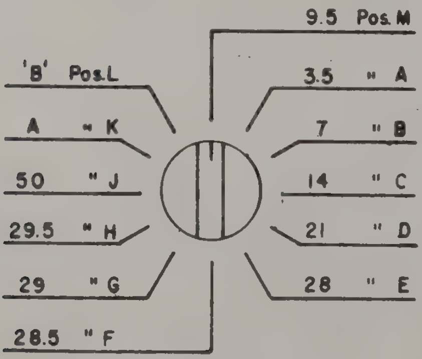
The crystal oscillator functions in either of two modes depending upon the type of crystal used and the circuitry switched in for that crystal.

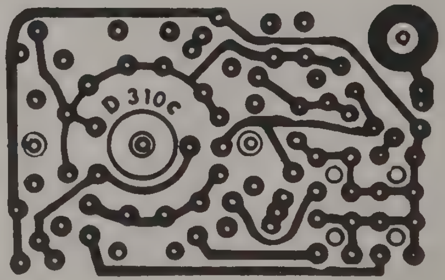
Crystals which function in the fundamental mode are employed at crystal frequencies below 18 Mc. For such crystals, the collector load of Q2 is a resistor. For overtone operation a tuned load, which places the oscillator into overtone function, is switched in.

The crystal oscillator is provided with a regulated 6.8 volt dc supply originating at the zener diode circuit on the calibrator module. The regulated supply gives the oscillator extreme stability under varying input loads.

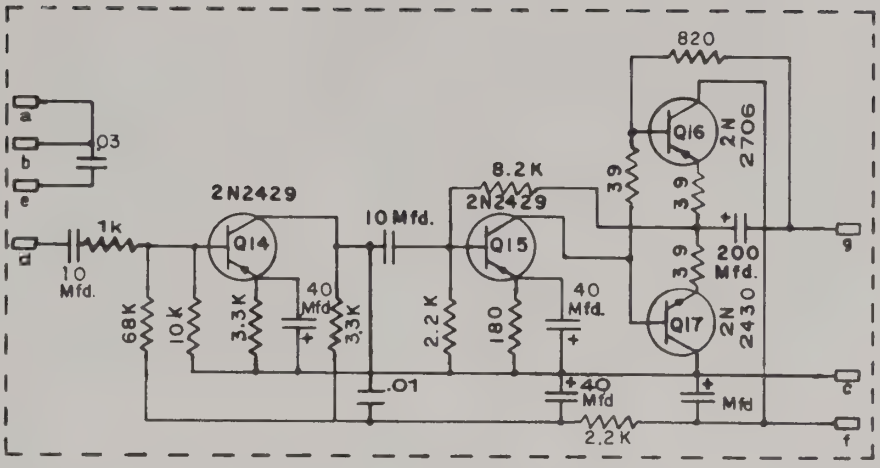
Service Notes:

If any problem arises, always check the voltage on the regulated line. The voltage should read between 5 and 7.5 volts on a VOM or VTVM. If the voltage is not in this range, check the calibrator module for malfunction of the zener regulator. Emergency repair suggestions are given in the calibrator module Service Notes.





4-16 Audio Module



The audio amplifier stages of the DR-30 are designed for good fidelity, low distortion, wide frequency response, and adequate power output for communications use under conditions of high ambient noise levels.

Q14 is employed as a preamplifier with an impedance appropriate for matching the two detectors. Q15 is the driver transistor, and Q16-Q17 are a matched complementary pair of output transistors. The output circuitry is transformerless and matches a wide range of speaker or earphone impedances. The current drain of the audio system is kept as low as possible when no signal is applied and rises as high as 120 ma. under conditions of maximum audio output.

The output of the audio stage is through a large capacitor which couples the transistors to the load. AC feedback is applied to the output stage and is derived from the load. DC feedback is derived from the output stage midpoint and is returned to the driver transistor base. The feedback helps assure minimum distortion and extended frequency response.

The .03 mfd capacitor connected to S6, when switched in, provides some degree of high-frequency attenuation in the preamp circuit. This "tone control" is most useful when the wide selectivity position is employed on AM reception and is quite effective in reducing background noise.

Low frequency performance of the audio stage is such that a good speaker system will reveal excellent response, allowing high-fidelity reception of shortwave broadcast stations.

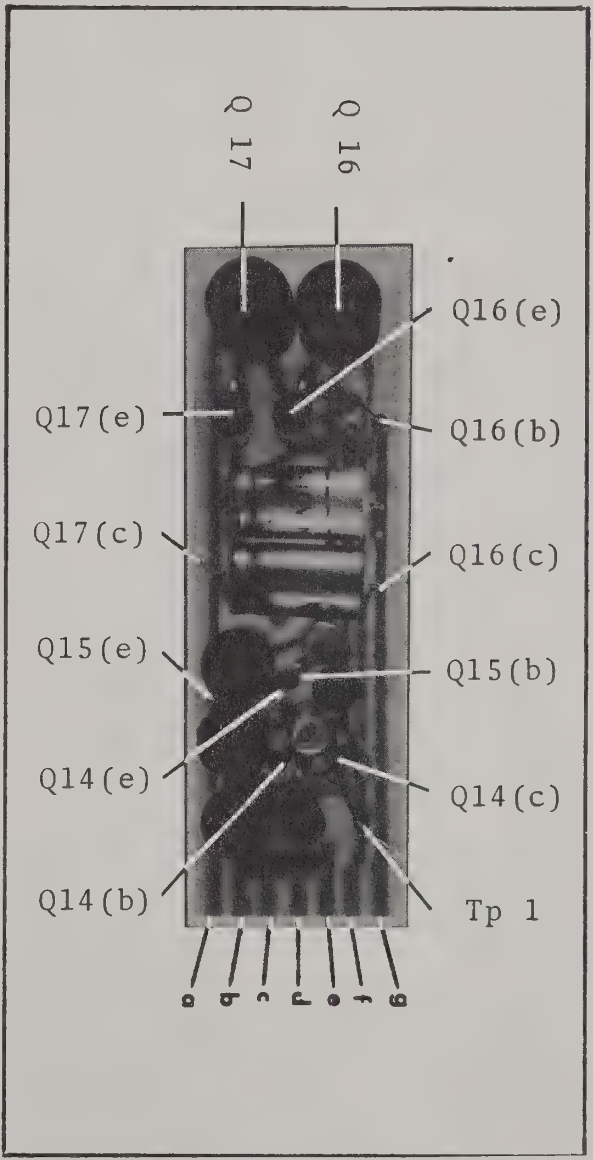
Aside from the use of the tone control when desired, no attempt is made to limit frequency response of the audio to that essential for communications use. Instead, the IF passbands of the receiver are employed to limit the frequency when interference makes such limitation desirable. Thus, the wide selectivity position allows wide-band audio response when conditions make its use practical.

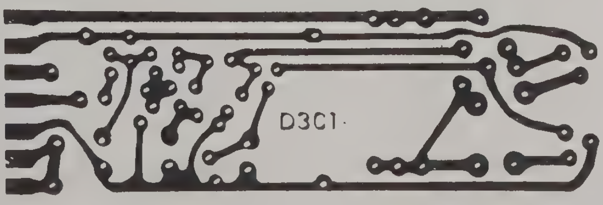
The output transistors are covered with black, turned aluminum heat sinks which successfully dissipate any heating that occurs in the transistors under high output conditions.

Note: in connecting the DR-30 to a high-fidelity music system, it is not necessary to bypass the audio output Stage. Set the audio gain control about 20% "on" and adjust the volume with the system's volume control. The receiver output can be fed to the tape input, high level phono input, or microphone input connections.

Service Notes:

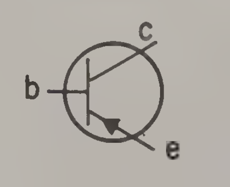
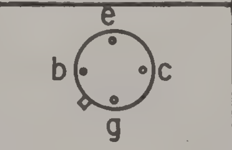
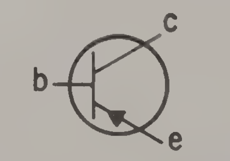
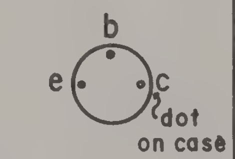
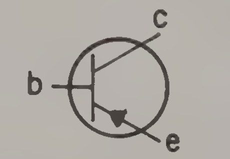
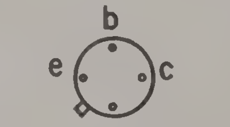
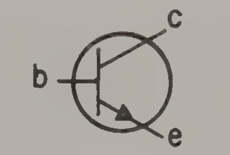
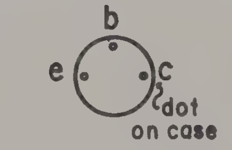
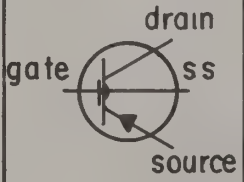
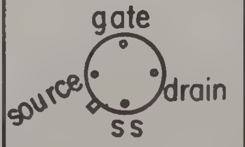
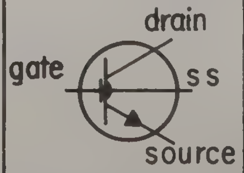
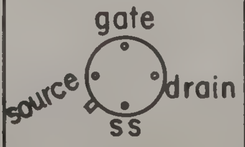
This circuit is conservatively designed, and failures are extremely rare. Of course, no adjustments or recalibrations are necessary. The receiver can be operated under sustained high levels without any load presented to the terminals, but the output should not remain shorted for more than several minutes under high levels of operation. Momentary short circuits cause no damage.



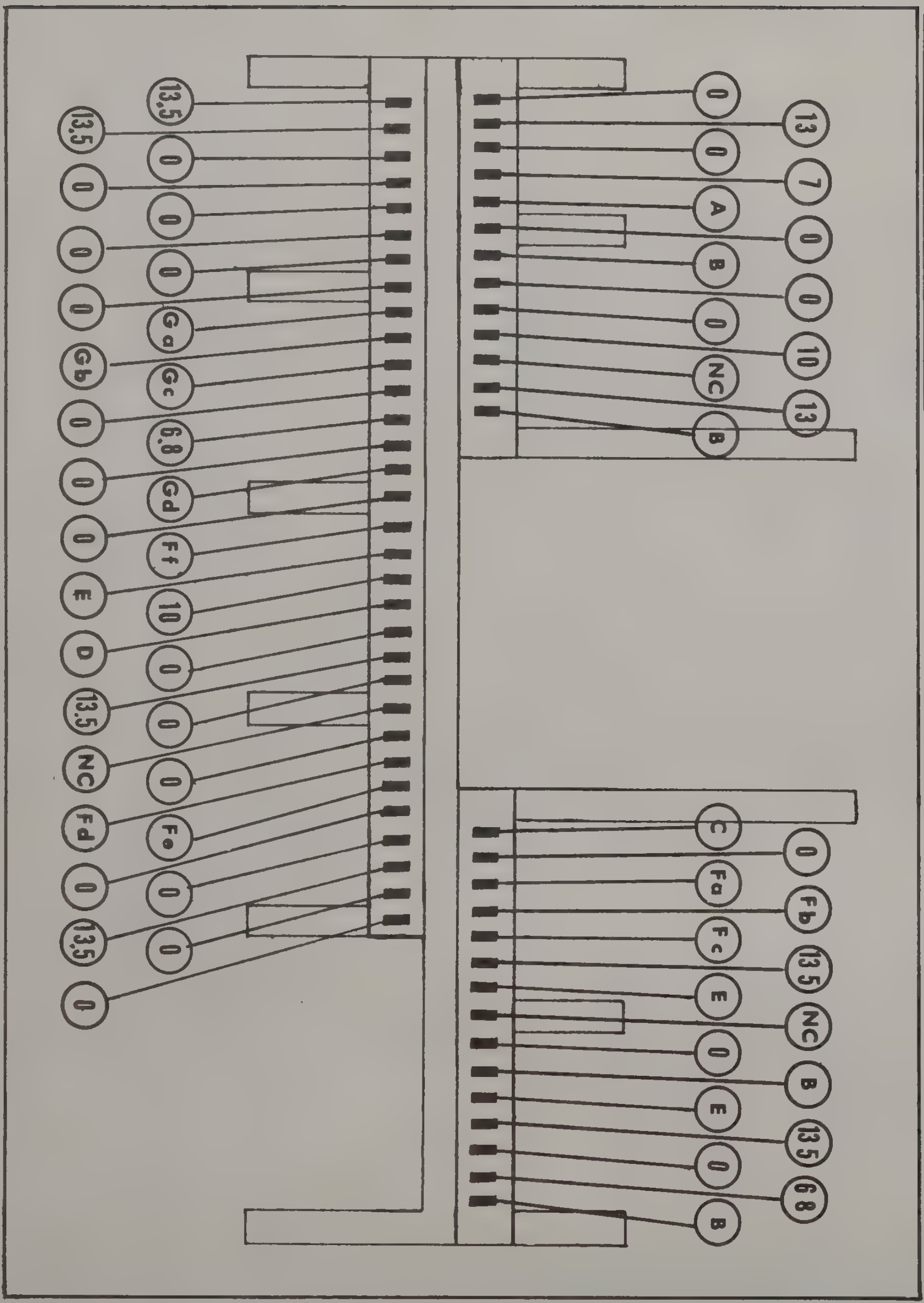


4-17. Transistor Base Diagrams

TRANSISTOR DIAGRAMS

Transistor Type	Symbol	Base Layout bottom view	Description
2N990 2N993			PNP Germanium
2N1638 2N2429 2N2706			PNP Germanium
2N2084			PNP Germanium
2N2430			NPN Germanium
K 1504			P-Channel (UHF) MOS Field-effect device
K 1004			N-Channel (UHF) MOS Field-effect device
e= emitter	b= base	C=collector	SS= substrate

4-18. Connector Voltages



4-20. In Case of Difficulty

In almost every case of apparent malfunction of the receiver, external connections or operator techniques are found to be the source of the difficulty. Perform carefully each of the following procedures before removing the receiver from its case.

(1) Pull out on the standby switch/RF gain control. Check again to be sure that it is out. (Pushing it in turns the receiver to the standby position.

(2) Turn the RF gain control fully counterclockwise. Counterclockwise means to the left:

Note: the control operates in this fashion for a technical reason. However, it is opposite in action to many RF gain controls, and the low gain in the fully clockwise position can alarm the operator who has not read any portion of the manual before using the receiver.

(3) Check the antenna connection. It must be plugged into the correct jack before signals can be correctly heard. For all bands except 6 meters use the following:

For 6 meters only, use the antenna input jack marked "6-ant" as indicated:

(4) Check the power supply. If accidentally shorted, batteries can fail very quickly, and so-called "fresh" batteries often prove to be weak. They should always be measured under load, i.e., with the receiver and the panel lights turned on. If the voltage of the battery pack, as measured on a VOM or VTVM, is under 11.8 volts, the batteries are not adequate and should be replaced. See notes in section 2-5 on battery supplies.

(5) Check all Jones Plug connections. Note that jumpers must be installed in the plug or other muting provisions must be made.

(6) Under some circumstances, turning the ANL LEVEL control fully clockwise can cause distortion, apparant lack of gain, or other indications of receiver malfunction. Correctly used, the ANL is effective and easily operated, but you should return it to its fully counterclockwise (left) position when it is not in use.

The above steps will usually identify any operator mistakes. If a difficulty persists, perform the following operations to localize the problem.

Difficulties are rare in the DR-30 because conservative construction practices, top-quality components, and thorough quality-control measures are employed.

Each step in the following procedure is designed to provide information about the receiver functions and will also give data on associated circuitry such as antenna systems, power supplies, and other accessories. Proceed through the steps below until you fail to get the proper response. Do not attempt to bypass any steps in the operation.

Step 1

Turn on the set. Turn on the dial lights. They should be adequately bright, but not white-bright.

Put the AGC/hold switch in the right-hand "hold" position. Watch the S-meter while pushing in the RF gain control/standby switch and then while pulling it out. At the moment the switch is pulled out, the meter should rise rapidly to the right and then gradually fall back to the left-hand position. This test confirms the functioning of the AGC system and some of the internal voltages.

Step 2

Push the cal/lt switch to its left (cal) position. Set the bandswitch on the 10 Mc. position and tune the receiver to exactly 10 Mc. as indicated on the dial. Rotate the RF gain control to the right (clockwise) until it stops. Make sure that it is pulled out.

Set the other controls as follows:
- Selectivity at 5 kc. (right-hand position)
- ANL level at full left
- Notch tune at the 9 o'clock position
- Function switch at the LSB position
- Audio gain as required to hear the signal

Tune the preselector to the 10 Mc. position. You should hear the whistle of the calibrator signal, and the S-meter should read the calibrator signal nearly full scale.

When these responses occur, you can rotate the RF gain control fully counterclockwise (to the left), connect a proper antenna, and tune stations, as you have confirmed the operation of the receiver circuitry.

PACKING for SHIPMENT

If a DR-30 is to be repackaged for shipment, use the original shipping container and materials if possible. You may obtain a new shipping container by writing DAVCO and paying postage on the empty carton. If original packing is not used, observe the following instructions.

Wrap the receiver in a plastic bag or a cloth to prevent scratching the panels. Then wrap it in heavy brown paper. Pack the wrapped receiver in a strong shipping container which allows at least three inches on each side, the top, and the bottom of the receiver, and fill these spaces with shock-absorbing material. (Rolled newspaper, foam plastic, or strips of cardboard will suffice.) Be sure to fill the container adequately so that the receiver will not shift inside the container. Seal the container and mark it FRAGILE.

Do not return a receiver to the factory for service or modification without prior authorization from the Service Department. Attach a tag to the main tuning knob indicating the return address, serial number, and date of shipment to DAVCO. Enclose a note indicating the type of service required, and full return address, and shipping instructions. In all correspondence, refer to the instrument by model number and full serial number. Write for the authorized service station in your area.

4-21. Parts List

RF MODULE

Description	Qty	DAVCO#	Sch. #
Circuit Board	1	D308C	
Diode: Germanium 1N60	2		D1, D2
Cap.: 51pf 100 v. dipped mica 5%	2		
Cap.: 120pf 100v dipped mica 5%	2		
Cap.: 360pf 100v dipped mica 5%	3		
Cap.: .01MFD 100v disc ceramic	2		
Resistor: 180 ohm 1/4 watt 10%	1		
Resistor: 330 ohm 1/4 watt 10%	1		
Resistor: 470 ohm 1/4 watt 10%	1		
Resistor: 39 ohm 1/4 watt 10%	1		
Resistor: 39K ohm 1/4 watt 10%	1		
Resistor: 2.2 meg. ohm 1/4 watt 10%	1		
Inductor: 91 microhenry, 50 ma. choke	1	D003CH1	
Inductor: Toroidal	1	D003TO2	L1
Inductor: Toroidal	1	D003TO3	L5
Terminal: Transistor socket	1	D003TS1	
Cap.: .03MFD 50v disc ceramic	1		
Terminal: solder; stake type	4	D003ST1	
Inductor: adjustable	1	D003CO1	L2
Inductor: adjustable	1	D003CO1	L3
Inductor: adjustable	1	D003CO1	L4
Inductor: adjustable	1	D003CO3	L6
Inductor: adjustable	1	D003CO1	L7
Inductor: adjustable	1	D003CO1	L17
Transistor: type K1504 (FET)	1		Q1

FIRST IF MODULE

Description	Qty	DAVCO#	Sch. #
Circuit Board	1	D307C	
Transistor: type 2N993	6		Q4a, Q5 Q6, Q7, Q8, Q4
Diode: Germanium 1N69	3		D3, D4, D5
Cap.: .01MFD 100v disc ceramic	13		
Cap.: .001MFD 100v disc ceramic	3		
Cap.: 680pf 100v dipped mica 5%	1		
Cap.: 10pf 100v dipped mica 5%	1		
Cap.: 10MFD(AMP) 16v electrolytic	1		
Filter: transfilter type TF-01A	2		TF1, TF2
Inductor: 91 microhenry, 50ma. choke	2	D003CH1	
Transformer: 455 kc IF	2	D003T11	
Inductor: adjustable	1	D003CO2	L12
Terminal: solder	6	D003ST1	
Resistor: 180 ohm 1/4 watt 10%	3		
Resistor: 330 ohm 1/4 watt 10%	1		
Resistor: 470 ohm 1/4 watt 10%	1		
Resistor: 1 K ohm 1/4 watt 10%	2		
Resistor: 1.2K ohm 1/4 watt 10%	2		
Resistor: 1.8K ohm 1/4 watt 10%	2		
Resistor: 3.3K ohm 1/4 watt 10%	2		
Resistor: 3.9K ohm 1/4 watt 10%	1		
Resistor: 4.7K ohm 1/4 watt 10%	3		
Resistor: 5.6K ohm 1/4 watt 10%	1		
Resistor: 12K ohm 1/4 watt 10%	7		
Resistor: 18K ohm 1/4 watt 10%	1		
Resistor: 27K ohm 1/4 watt 10%	1		
Resistor: 39K ohm 1/4 watt 10%	1		
Resistor: 4.7 meg. ohm 1/4 watt 10%	1		
Transistor: type K1004 (FET)	1		Q3

MECHANICAL FILTER MODULE

Description	Qty	DAVCO#	Sch. #
Circuit Board	1	D304C	
Transistor: type 2N993	1		Q11
Diode: Germanium type 1N60	3		D7, D8 D17

MECHANICAL FILTER continued

Description	Qty	DAVCO#	Sch#
Cap.:01MFD 100v. disc ceramic	6		
Cap.:180pf 100v. dipped mica 5%	1		
Cap.:120pf 100v. dipped mica 5%	1		
Resistor: 2.2K ohm 1/4 watt 10%	1		
Resistor: 3.9K ohm 1/4 watt 10%	1		
Resistor: 5.6K ohm 1/4 watt 10%	1		
Resistor: 6.8K ohm 1/4 watt 10%	2		
Resistor: 12K ohm 1/4 watt 10%	4		
Resistor: 27K ohm 1/4 watt 10%	1		
Crystal: 455.00 kc	1	D003XT2	
Filter: Collins type 455FA21	1		
Terminal: solder; stake type	3	D003ST1	

SECOND IF MODULE

Description	Qty	DAVCO#	Sch#
Circuit Board	1	D303B	
Transistor: type 2N993	4		Q12, Q20 Q21, Q13
Diode: Germanium 1N60	4		D9, D10, D11, D12
Cap.: .01MFD 100v disc ceramic	12		
Cap.: 1MFD 16v electrolytic	2		
Cap.: 10MFD 100v disc ceramic	3		
Cap.: .001MFD 100v disc ceramic	2		
Filter: transfilter type TF01A	1		TF-3
Transformer: IF	1	D003T11	TIF-3
Resistor: 12K ohm 1/4 watt 10%	1		
Resistor: 1.8K ohm 1/4 watt 10%	3		
Resistor: 5.6K ohm 1/4 watt 10%	1		
Resistor: 100 ohm 1/4 watt 10%	1		
Resistor: 470 ohm 1/4 watt 10%	4		
Resistor: 1K ohm 1/4 watt 10%	1		
Resistor: 2.7K ohm 1/4 watt 10%	1		
Resistor: 3.9K ohm 1/4 watt 10%	1		
Resistor: 4.7K ohm 1/4 watt 10%	3		
Resistor: 10K ohm 1/4 watt 10%	4		
Resistor: 2.2K ohm 1/4 watt 10%	1		
Resistor: 39K ohm 1/4 watt 10%	1		
Resistor: 68K ohm 1/4 watt 10%	1		
Terminal: solder; stake type	4	D003ST1	

CALIBRATOR MODULE

Description	Qty	DAVCO#	Sch#
Circuit Board	1	D305d	
Zener Diode 6.8v 10% 1/4 watt	1	ZD2	
Transistor: type 2N1638	3		Q22, Q23 Q24
Cap.: 120pf 100v dipped mica 5%	2		
Cap.: 180pf 100v dipped mica 5%	1		
Cap.: .01MFD 100v disc ceramic	3		
Resistor: 180 ohm 1/4 watt 10%	1		
Resistor: 470 ohm 1/4 watt 10%	1		
Resistor: 1.2K ohm 1/4 watt 10%	1		
Resistor: 2.7K ohm 1/4 watt 10%	1		
Resistor: 3.3K ohm 1/4 watt 10%	1		
Resistor: 4.7K ohm 1/4 watt 10%	2		
Resistor: 8.2K ohm 1/4 watt 10%	1		
Resistor: 10K ohm 1/4 watt 10%	1		
Resistor: 18K ohm 1/4 watt 10%	1		
Resistor: 22K ohm 1/4 watt 10%	2		
Resistor: 33K ohm 1/4 watt 10%	1		
Resistor: 68K ohm 1/4 watt 10%	1		
Resistor: 180K ohm 1/4 watt 10%	1		
Crystal: 100 kc	1	D003XT1	
Cap.: 320pf Cer. Var. Scdr. adj.	1	D003CV1	TC-5

BFO MODULE

Description	Qty	DAVCO#	Sch#
Circuit Board	1	D303	
Transistor: type 2N1638	1		Q18
Transistor: type 2N993	1		Q19
Cap.:180pf 100v dipped mica 10%	1		
Cap.: 10mfd 16v electrolytic	1		
Cap.:.01 mfd 100v disc. ceramic	4		
Resistor: 100 ohm 1/4 watt 10%	1		
Resistor: 470 ohm 1/4 watt 10%	1		
Resistor: 1.2K ohm 1/4 watt 10%	1		

Description	Qty	DAVCO#	Sch. #
BFO continued			
Resistor: 1.8K ohm 1/4 watt 10%	1		
Resistor: 3.3K ohm 1/4 watt 10%	1		
Resistor: 4.7K ohm 1/4 watt 10%	1		
Resistor: 33K ohm 1/4 watt 10%	2		
Resistor: 39K ohm 1/4 watt 10%	1		
Resistor: 330K ohm 1/4 watt 10%	1		
Crystal: 453.650 kc.	1	D003XT3	
Crystal: 456.350 kc.	1	D003XT4	
Resistor: 100 ohm, adjust. 10-turn	1	D003TP1	
Terminal: solder; Stake type	3	D003ST1	
Inductor: mutual	1	D003CH2	
Resistor: 10k ohm 1/4 watt 10%	1		
VFO MODULE			
Circuit Board	1	D306B	
Transistor: type 2N2084	1		Q9
Transistor: type 2N993	1		Q10
Zener Diode: 6.8v 10% 1/4 watt	1		2D-1
Cap.: 120pf 100v dipped mica 5%	2		
Cap.: 500pf 100v dipped mica 5%	1		
Cap.: .01MFD 100v disc ceramic	7		
Resistor: 330 ohm 1/4 watt 10%	1		
Resistor: 1k ohm 1/4 watt 10%	2		
Resistor: 1.8k ohm 1/4 watt 10%	2		
Resistor: 3.9k ohm 1/4 watt 10%	1		
Resistor: 5.6k ohm 1/4 watt 10%	3		
Resistor: 18k ohm 1/4 watt 10%	1		
Resistor: 27k ohm 1/4 watt 10%	1		
Inductor: toroidal	1	D003T01	L13
Inductor: adjustable	1	D003C01	L14
Terminal: soldering; stake type	7	D003ST1	
Cap.: 360pf 100v dipped mica 5%	1		
Resistor: 12k ohm 1/4 watt 10%	1		
Cap.: 180pf 100v dipped mica 5%	1		
Resistor: 180k ohm 1/4 watt 10%	1		
CRYSTAL OSCILLATOR MODULE			
Circuit Board	1	D310C	
Transistor: type 2N990	1		Q2
Cap.: .01MFD 100v. disc ceramic	1		
Cap.: 180pf 100v. dipped mica 5%	1		
Cap.: 20pf 100v. dipped mica 5%	1		
Cap.: 5pf 100v. dipped mica 5%	1		
Resistor: 22K ohm 1/4 watt 10%	1		
Resistor: 1K ohm 1/4 watt 10%	1		
Resistor: 8.2K ohm 1/4 watt 10%	1		
Resistor: 2.2K ohm 1/4 watt 10%	1		
Terminal: soldering eyelet	5	D003ET1	
Inductor: adjustable	1	D003CO4	L8
Inductor: adjustable	1	D003CO5	L9
Inductor: adjustable	1	D003CO6	L10
Inductor: adjustable	1	D003CO7	L11
AUDIO MODULE			
Circuit Board	1	D301B	
Transistor: type 2N2429	2		Q14, Q15
Transistor: type 2N2707 mtc. pr.	1		Q16, Q17
Cap.: 125MFD 15 volts electrolytic	1		
Cap.: 200MFD 15 volts electrolytic	1		
Cap.: 40 MFD 15 volts electrolytic	3		
Cap.: 10 MFD 15 volts electrolytic	2		
Cap.: .03MFD 50 volt disc ceramic	1		
Resistor: 3.9 ohm 2 watt 5%	2		
Resistor: 39 ohm 1/4 watt 10%	1		
Resistor: 820 ohm 1/4 watt 10%	1		
Resistor: 180 ohm 1/4 watt 10%	1		
Resistor: 1K ohm 1/4 watt 10%	1		
Resistor: 2.2K ohm 1/4 watt 10%	2		
Resistor: 3.3K ohm 1/4 watt 10%	2		
Resistor: 8.2K ohm 1/4 watt 10%	1		
Resistor: 10K ohm 1/4 watt 10%	1		
Resistor: 68K ohm 1/4 watt 10%	1		
Heat Sink	2	D003HS1	
Cap.: .01MFD 100volts disc ceramic	1		
MISCELLANEOUS			
S-Meter 0-2MA	1	D003SM1	
Cap.: 250pf 15v Electrolytic	1		
Cap.: 3-18pf Ceramic Vara.	1	D003CV1	TC-6
Cap.: 20pf 100v. dipped mica 5%	1		
Inductor: Toroidal	1	D003TO4	L18
Cap.: 3-15pf Ceramic Vara.	1	D003CV1	TC-2
Cap.: Vara., 2-gang 0-140pf/Sect.	1	D003CV3	C1
Lamps: Sylvania type 6ES	2		
Cap.: Variable, 0-100pf	1	D003CV4	C3
Cap.: 3-15pf Ceramic Vara.	1	D003CV1	TC-6
Switch: 3 position 3 pole slide	1	D003WH7	S7
Switch-Toggle: AGC Hold, spdt, Center-off	1		S5
Resistor: 2.7K ohm 1/4 watt 10%	1		
Cap.: 10pf 100v. dipped mica 5%	1		
Switch: Function 3p, 3p, Rotary	1	D003WH8	S2
Cap.: 10pf 100v. dipped mica 5%	1		
Switch-Toggle: Chassis Polarity spdt	1		S9
Resistor: Vara., 120Kohm 1/4 watt Z taper with push-pull switch	1	D003WH5	R1
Diode: silicon 500 MA 100PIV	1		D13
Cap.: 125pf 16v. Electrolytic	1		
Switch: 2-pole 3 position Slide (Cal-Lt)	1	D003WH6	S8
Switch: toggle spdt with center-off	1		S6
Resistor: Vara. 20K Z taper with spst switch (AF Gain)	1		R2
Resistor: Vara. 20K linear taper (ANL level)	1		R3
Cap.: 3-15pf Ceramic Vara.	1	D003CV1	TC-4
Inductor: Adjustable high-Q	1	D003CO4	L16
Cap.: .01MFD 100 v. disc ceramic	2		
Cap.: 1200pf 100v. dipped mica 5%	1		
Cap.: Vara. main tuning, 3 section 0-528pf/Section	1	D003CV3	C2
Connector, 8-contact female, Cinch-Jones S-308-AB	1		
Case USE PLUG P-308-CCT	1	D003CA1	
Rubber Feet	5	D003RF1	
Knurled Knob	1	D003FB7	
Dial Lock	1	D003FB8	
Preselector Pointer	1	D003FB9	
Front Panel	1	D003PA3	
Window	1	D003FB6	
Small Back	1	D003PA4a	
Miter Gear	1	D003GE2	
Anti-backlash gear assembly	1	D003GE1	
Split Gear Spring	2		
Drive Unit Assembly	1	D003AL2	
Main tuning Knob	1	D003KN1	
Coax Clip	1	D003FB1	
Dial Pointer	1	D003FB2	
String Drum	1	D003FB3	
Small Knob	5	D003KN2	
Back Panel	1	D003PA4	
Connector: Phono Jack, panel	7	D003PA4	
Label	1	D003LA2	
Connector: teflon insulated feed-through	3		
Dial Plate	1	D003LA1	
Sub Panel	1	D003PA2	
Pulley Strip	1	D003PP5	
Vernier Drive Jackson Bros Type DAF	1	D003VD1	
Grommet, 1/4" od	2		

NOTES

This manual is augmented from time to time. Please keep the Service Department of DAVCO ELECTRONICS, Inc. informed of any change in your address so that you may receive the supplements.

In case of change of ownership, transfer of warranty will be made only if DAVCO is informed of the change within ten days by return of this card or by letter. Always refer to the receiver by full model number and serial number.

Former: Serial Number ______
Name ______
Address ______
______
Zip Code ______

Change to:
Name ______
Address ______
______

Comments:

Change of address ○ ownership ○

Former: Serial Number ______
Name ______
Address ______
______
Zip Code ______

Change to:
Name ______
Address ______
______

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DAVCO
DR-30

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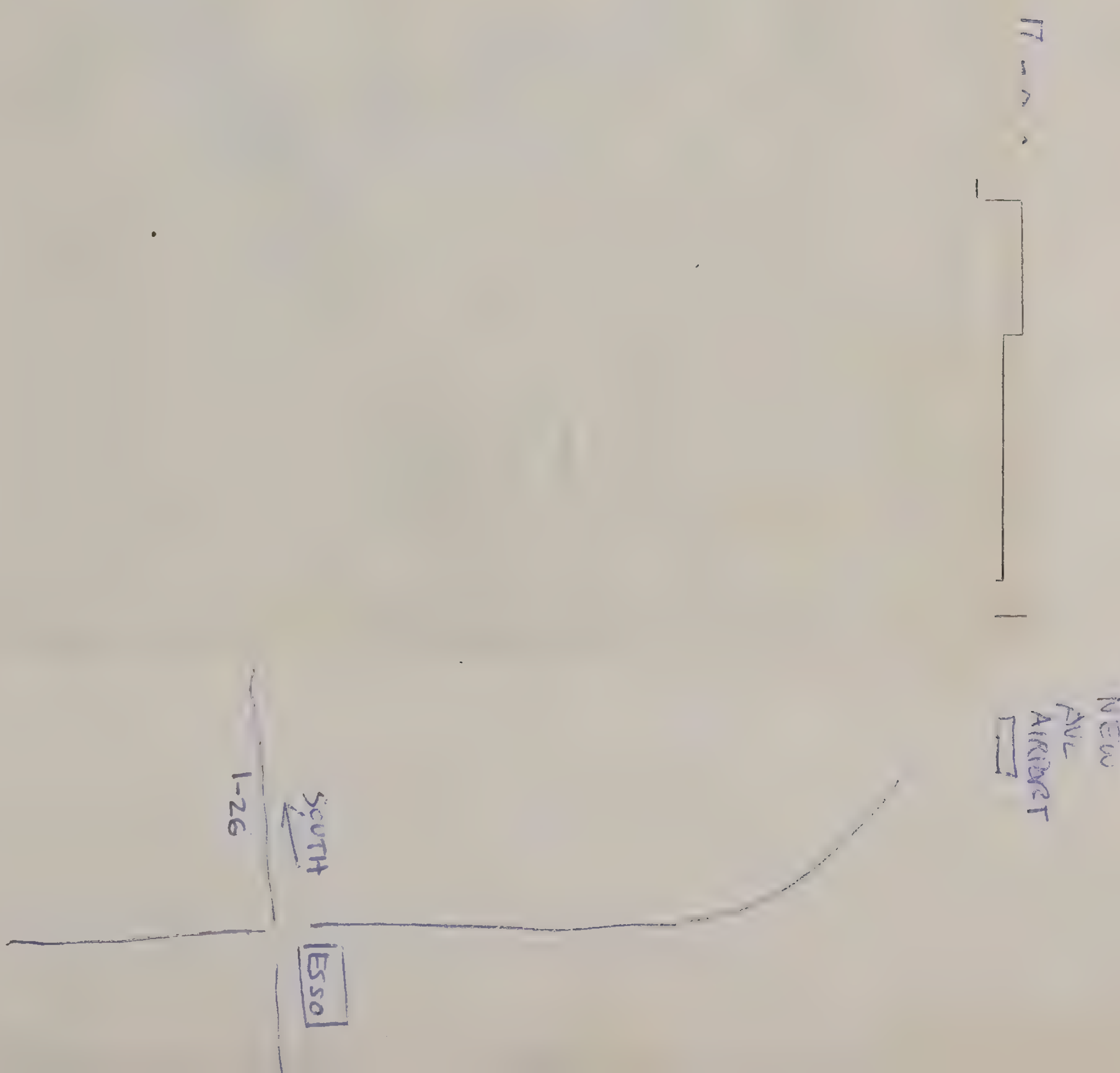

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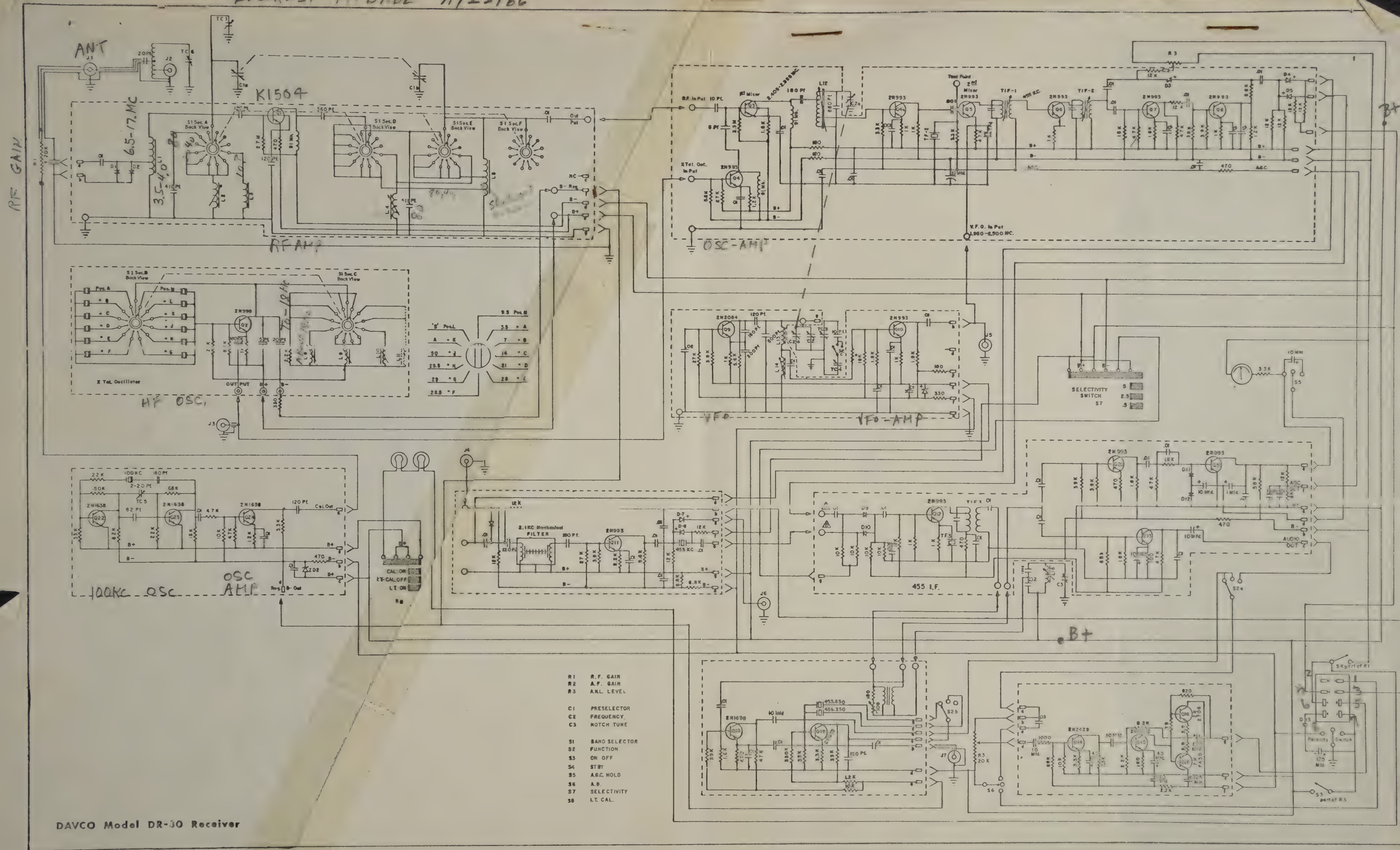

DAVCO Model DR-30 Receiver

R1	R.F. GAIN
R2	A.F. GAIN
R3	A.N.L. LEVEL
C1	PRESELECTOR
C2	FREQUENCY
C3	NOTCH TUNE
S1	BAND SELECTOR
S2	FUNCTION
S3	ON OFF
S4	ST BY
S5	A.G.C. HOLD
S6	A.B.
S7	SELECTIVITY
S8	LT. CAL.

DAVCO DR-30 COMMUNICATIONS RECEIVER

TECHNICAL DESCRIPTION

The DR-30 receiver is a double-conversion superheterodyne unit with frequency coverage of 12 one-half megacycle bands in the range of 3.5 to 54 megacycles.

Signals from the antenna input J1 pass through the RF GAIN CONTROL and thence to a low-impedance tap on the antenna input coil L1. This high-Q toroidal inductor is tuned by the preselector capacitor to a frequency range of approximately 6.5 Mc. to 17 Mc. For frequencies lower than this range, capacitors are connected across the toroid by the bandswitch S1; for higher frequencies, inductors are connected. The RF amplifier, Q1, is a field-effect transistor (Type K1504). The field-effect transistor is characterized by a high operating impedance, and is a voltage-operated device similar to a tube. This voltage-operation allows maximum preselector selectivity, since no compromise between power transfer and Q is necessary as would be the case with normal (bipolar) transistors. Additionally, the transfer characteristics of the field-effect transistor approach very closely the theoretical square-law configuration and performance under conditions which lead to cross-modulation and overloading in other devices is markedly superior. Since the field-effect transistor is a majority-carrier device, the shot-noise noted in bipolar transistors is absent, and this field-effect transistor allows extremely low-noise operation even to the UHF region. The output from the RF amplifier is via a tuned circuit similar to the input circuit.

The high-frequency conversion oscillator, Q2, is operated in the fundamental mode from crystals up to 18 Mc., and as an overtone oscillator above that, by selecting the collector load as a resistor for fundamental operation and a tuned circuit for overtone. A different tunable collector circuit is provided for each overtone crystal range. The first conversion oscillator is fed to an oscillator amplifier, Q4, which provides correct amplitude and impedance matching for the first mixer.

Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. This is also a field-effect

TECHNICAL DESCRIPTION (cont)

One additional 455 kc IF amplifier (Q12) follows the filters, and precedes the rejection notch circuit. A back-panel screwdriver notch depth control is factory pre-set for best results. This notch is tunable across the IF passband, and provides up to 60 db rejection of an interfering carrier. Since, like the noise limiter, the notch eliminates the interference before the AGC circuitry of the receiver, the AGC is not actuated by the interference but only by the desired signal. The receiver is, therefore, operating at the optimum sensitivity for the desired signal, not the QRM-QRN.

Following the notch circuit is the AGC isolation amplifier, Q20, which prevents the AGC detector (Q21) from causing distortion in the other detectors. The AGC detector itself operates in a bootstrap arrangement to provide the fast-attack adjustable-hold characteristics which are desired. The output of the AGC amplifier varies with signal strength from full B- to 1 volt negative; this control voltage is fed via a voltage divider to the RF stage, the 1st IF amplifier, the 2nd mixer, and the 1st 455 kc amplifier, and is also sent to the S-meter. Hold action for the AGC is adjusted by changing the RC constant of the hold circuit.

For CW and SSB reception, a crystal BFO-carrier generator signal (Q19) chosen in relation to the passband of the mechanical filter is injected into the product detector (Q18). A circuit in the VFO shifts that frequency to compensate for the USB and LSB signal-frequency shift. For AM reception, a low-distortion AM detector (Q13) is employed.

The function switch, in addition to shifting the VFO and the BFO crystals, also selects the output of one or the other detectors and feeds them to the audio preamplifier, and thence to the AF Gain control. An additional audio preamp and driver stage then provide the signal for the push-pull transformerless audio output circuit which is

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Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. This is also a field-effect transistor stage, so that the high performance in weak-signal reception and rejection of undesired effects made possible in the RF amplifier are not degraded. The crystal oscillator frequencies on each band are chosen higher than the received signal, and the output range from the mixer is 2.405 to 2.955 Mc. This is fed to a high-Q tuned circuit tracked to the VFO by one section of the main tuning capacitor, C2. A first IF amplifier, Q4a, follows this circuit.

The VFO, or tuning oscillator, Q9, covers a range of 1.950 - 2.500 Mc., and utilizes a high-Q toroidal inductive element for extreme stability. Note that because of the choice of xtal frequencies, when the VFO frequency goes "up", the received frequency goes "down". An amplifier-buffer stage (Q10) for the VFO provides isolation for the tuning oscillator, and the voltage supply to the VFO is regulated by a separate zener regulator.

The second mixer combines the VFO and IF and has an output of 455 kc. Tunable IF transformers precede and follow a 455 kc amplifier (06) and several fixed-tuned ceramic 455 kc filter-resonators provide additional selectivity.

The output of the 455 kc amplifier is fed to the noise limiter amplifier (Q7) which increases the amplitude and rise time of the noise pulses which reach it. Since the effective selectivity is still rather broad at this point, no significant noise pulse lengthening has taken place here, as would be the case if the noise were not eliminated until after the highly selective IF filters. A noise amplifier-detector further processes the noise pulse, providing a pulse output which is used to turn "off" the switching diode gate (D3) for the duration of the noise pulse, effectively muting the receiver during this time.. Noise pulses are thereby prevented from actuating the AGC circuits or reducing the receiver sensitivity. The ANL level control adjusts the bias on the gating diode and therefore the noise limiter threshold.

Following the pulse gate several diodes D4, 5, 7, 8, 10, make up a switching network which changes the signal path to the various selectivity paths; DC biasing is applied to the diodes to turn them on or off as required. The broad selectivity incorporates three ceramic 455 kc filter resonators plus three IF transformers; the 2.1 kc selectivity path uses the Collins mechanical filter, while the narrowest path for CW reception uses a 455 kc xtal filter in series with the mechanical filter. Other switching diodes are used in the circuit for connecting the mechanical filter to the connector jacks on the rear of the receiver for use with a companion transmitter or other units.

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MECHANICAL DETAILS

The basis of the DR-30 construction is an extremely rigid solid aluminum extrusion. This extrusion is designed to support the plug-in printed circuit modules, and slots are milled in the massive part for attachment of connectors, panels, and other parts. All parts which require physical stability are attached to this base, and the capacitor drive unit is of similar construction, with a milled aluminum shape holding ball bearings for the drive shafts. All components except controls are mounted on printed circuit boards; G-10 glass epoxy board is used for maximum reliability. The boards may be removed for servicing as a subassembly. Cadmium-plated steel panels are used to support the controls and other parts. Throughout the receiver, components and parts used are operating well below their rated or designed maximum capabilities, thus assuring extreme reliability.

New, compact, high performance solid-state receiver for amateur applications

Featuring FIELD-EFFECT TRANSISTORS

FEATURES:

• Complete ham-band coverage 80-10 meters and portion of 6 meters • Standard-equipment 9.5-10.5 Mc band provides WWV and 31 meter SWL band • Three position selectivity for optimum fidelity and QRM rejection • Crystal-controlled BFO; separate AM and Product detectors; AF and RF gain controls • Full AGC with selectable decay time; S-Meter; illuminated dial • Flywheel tuning drive with high-ratio split gears; direct calibration on all bands • Tunable rejection notch filter; extremely effective noise limiter • Transmitter type VFO; crystal controlled first oscillator; built in crystal calibrator • Low power consumption, permitting 12V battery operation when desired; AC supply available • Full transistorization, diode selectivity switching, plug-in module construction, highest quality components • Rugged, stable extruded aluminum chassis for extreme stability; textured grey metal cabinet; FULLY GUARANTEED.

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DAVCO DR-30 RECEIVER $\$389^{50}$

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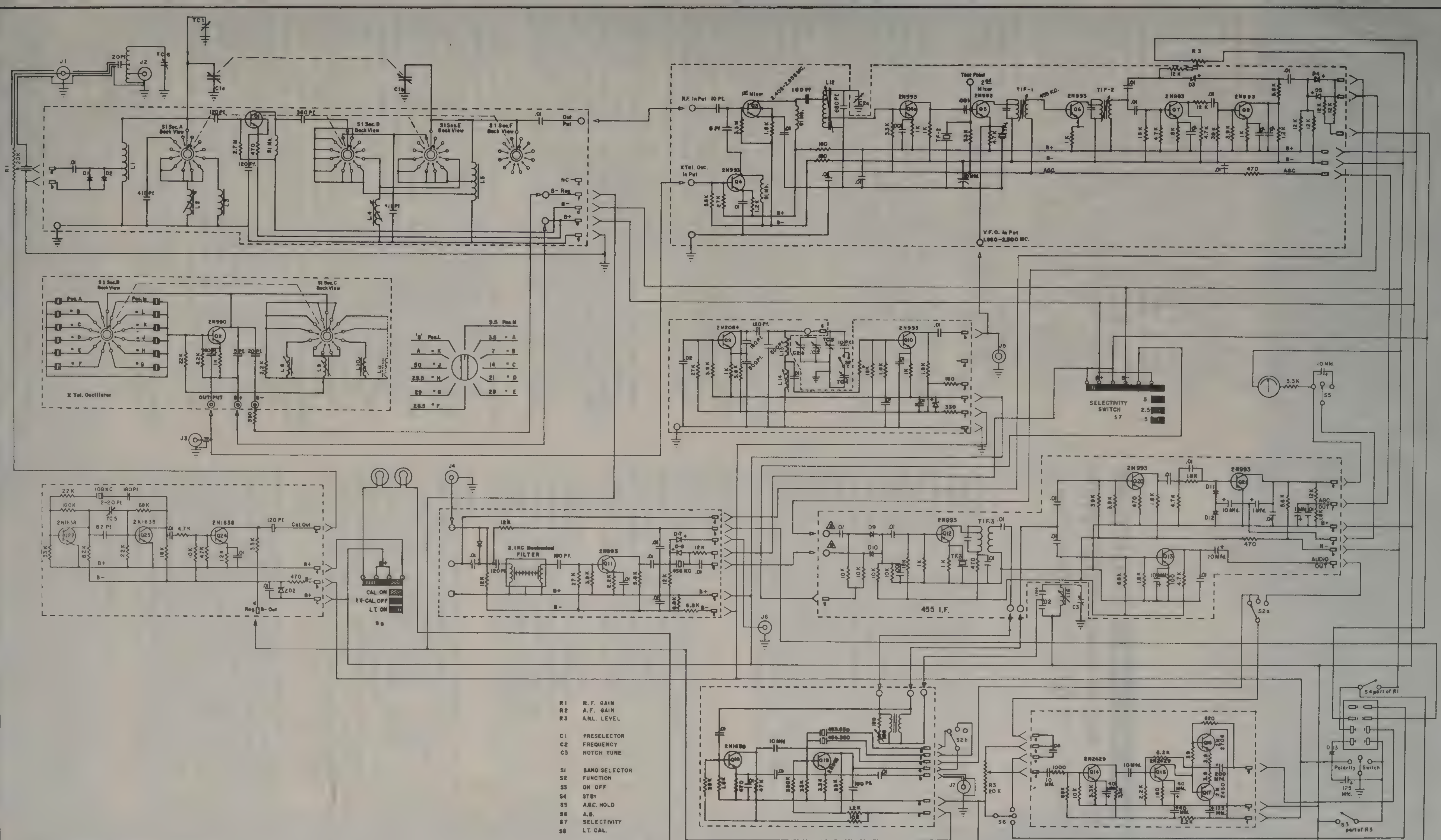

DAVCO Model DR-30 Receiver

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DAVCO's Design Philosophy

Through a philosophy—both imaginative and conservative — which combines the newest, improved components with the most sophisticated circuit techniques, DAVCO has been able to conceive and produce some of the finest equipment available to the amateur today.

Our constant and continuing attention to the requirements of the amateur fraternity and our use of only the highest quality materials result in equipment which provides full performance capability . . . great pleasure and confidence in operation . . . and full flexibility for the amateur's every application.

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The DR-30 is available direct from the factory. The price of $389.50 includes shipping costs within the U.S.A. A time payment plan requiring 10% down payment is available. Export orders receive prompt attention, and there is no charge for export packaging.

Extra crystals can be installed at the factory in the A and B bandswitch positions covering any 550 kc. ranges between 3.5 and 54 megacycles. The charge is $6.00 per crystal. Crystals can also be user-installed.

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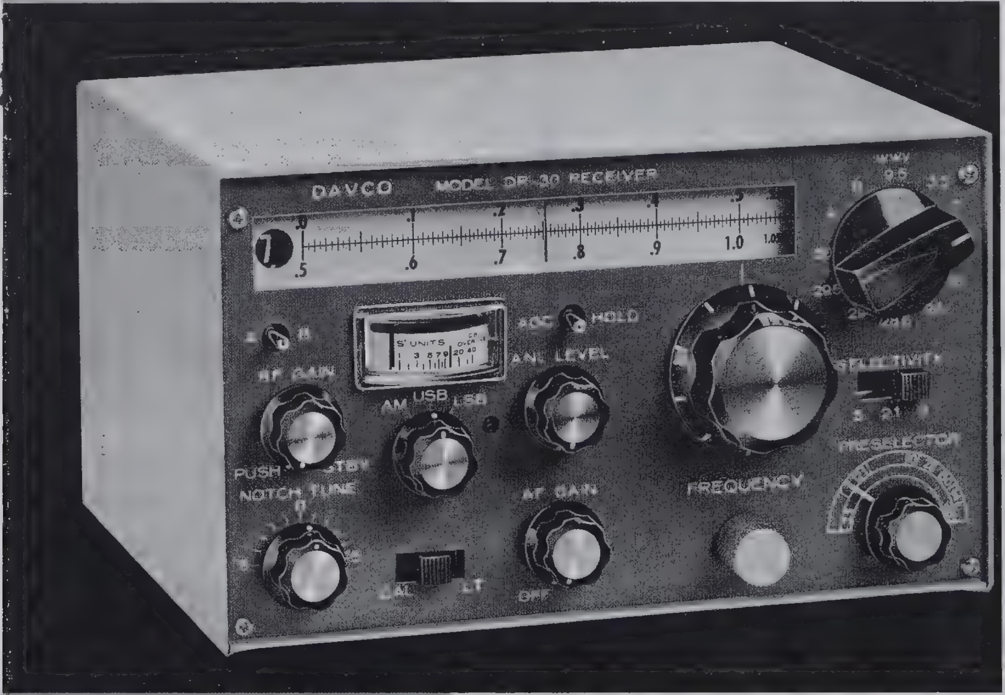
DAVCO DR 30

COMMUNICATIONS RECEIVER



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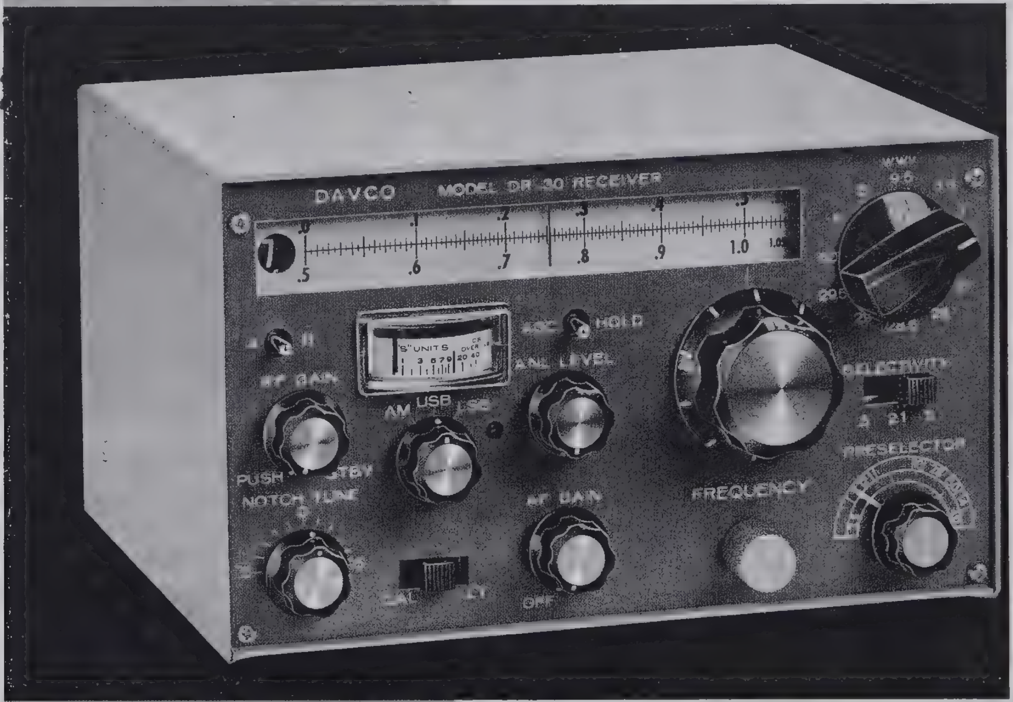

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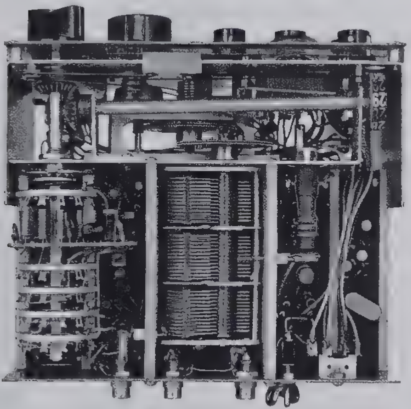
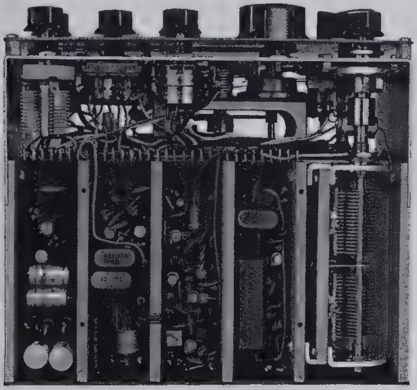




NOW! The DR-30 receiver provides the extra performance and operating capabilities found only in the finest base-station receiver, combined with the rugged construction, tuning ease and compact size (4″ H x 7⅛″ W x 6″ D) of a mobile unit. DAVCO's "Amateur Engineered" DR-30 meets the challenges put to it by the most demanding amateurs, no matter the preference in bands or modes of operation, and is an excellent choice for fixed, mobile or portable operation.

FIELD-EFFECT RF STAGE: Field-Effect transistors are the revolutionary new solid-state devices that make cross-modulation and overloading problems a thing of the past; they also allow superior image rejection and extreme sensitivity for weak-signal reception.

FULL COVERAGE: Complete ham-band coverage of 80 through 10 meters, the first half-megacycle of 6 meters, WWV and the 31 meter SWL band on 9.50-10.050 Mc, and optional coverage of any two additional 550 kc segments between 3.5 and 54 Mc (for CB, MARS, further 6-meter coverage, etc.)

VARIABLE SELECTIVITY: Front-panel selection of your choice of a wide IF for AM reception (6 selective elements giving a nominal 5 kc bandwidth), or a Collins 2.1 kc mechanical filter for superb SSB selectivity, or an ultra-sharp crystal filter for crowded-band CW use.

DETECTORS: Linear AM detector, separate product detector for SSB and CW utilizing a crystal-controlled BFO and carrier generator for USB and LSB.

NOISE LIMITER: True blanking action occurs before selectivity lengthens noise pulses; extremely effective on power-line and ignition-type interference.

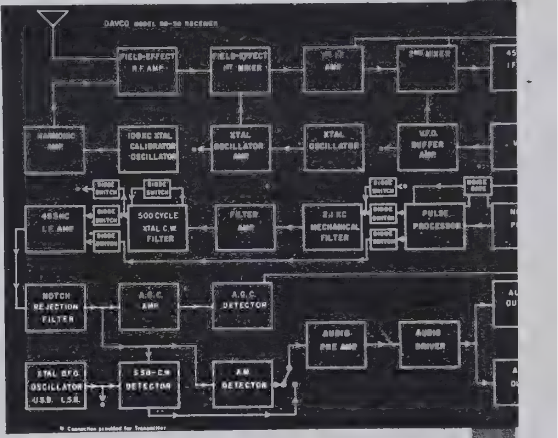
REJECTION NOTCH: Tunable notch provides more than 50 db rejection of undesired carrier. Pulls SSB and AM stations through under otherwise impossible conditions.

AGC: Full automatic gain control action on all modes, with selection of fast, medium or slow release time.

PLUS ALL THESE PERFORMANCE EXTRAS:

• Transmitter-type VFO • Crystal-controlled 1st oscillator • Separate RF and AF Gain controls
• Illuminated dial and S-meter • Built-in 100 kc. crystal calibrator
• Fully solid state—operates directly from 12-15 volts DC or accessory AC supply.

TECHNICAL DATA: DAVCO Model DR-30 Communications Receiver



Double conversion superhet, fully transistorized; crystal controlled first oscillator, ten crystals supplied for frequencies below:

3.5— 4.050 Mc
7.0— 7.550 Mc
9.5—10.050 Mc
14.0—14.550 Mc
21.0—21.550 Mc
28.0—28.550 Mc
28.5—29.050 Mc
29.0—29.550 Mc
29.5—30.050 Mc
50.0—50.550 Mc

plus two extra switch positions for other 550 kc segments optional.

SENSITIVITY: better than 1 μv for 10 db s/n; 1 μv for .3 watts audio.

SELECTIVITY: SSB: 2.1 kc Collins mechanical filter. AM: nominal 5 kc broad IF. CW: 200 cycle xtal filter in series with mechanical filter for improved skirt rejection.

STABILITY: negligible warm-up change; less than 100 cps change per hour; less than 25 cps for 20% power supply variation.

TUNING: spring-loaded split-gear drive unit, backlash-free; flywheel loading for large band excursions; adjustable dial drag and lock.

CALIBRATION: internal 100 kc crystal calibrator supplied; slide-rule dial has 5 kc markings, hairline pointer; tuning knob has 2 kc marks on perimeter; internal frequency shift for sideband compensation.

SPURIOUS RESPONSES: images and IF down at least 60 db below 22 Mc, at least 35 db 22-54 Mc Internal spurious less than equivalent 1 uv signal at input in ham bands.

FREQUENCY READOUT: significant figure (Mc) appears in indicator window, is color coded as to whether .000-.550 Mc or .500-1.050 section is in use. Can provide direct calibration with accessory crystals.

DETECTORS: linear AM detector; separate product detector for SSB and CW; crystal controlled BFO-carrier generator for USB and LSB.

AGC: full action on all modes of operation; has fast-attack characteristic; panel switch selects fast release (.015 seconds) for AM or break-in, medium (.2 sec.) or slow release (.8 sec) for SSB and CW. Audio output varies 8 db for 80 db change in RF input. AGC action is delayed to 5 microvolts.

NOISE LIMITER: true blanking type action occurs before selectivity lengthens pulses; has separate ANL amplifier and detector, diode noise gate. Front panel control.

RF STAGE: low-noise premium field-effect RF amplifier and mixer; input and output circuits employ high-Q toroidal inductors.

REJECTION NOTCH: tunable notch provides up to 60 db rejection of undesired carrier.

INTERMEDIATE FREQUENCIES: 1st IF: 2.405-2.955 Mc (variable, tracked), 2nd IF: 455 kc.

SEMICONDUCTOR COMPLEMENT:
23 bi-polar transistors
2 field-effect transistors
10 signal diodes
1 power diode
2 zener regulator diodes

AUDIO: .6 watt at 5% distortion; max 1 watt. Output impedance 8 to 45 ohms speaker; 600 ohm earphones preferred.

SIZE: 4″ H, 7⅛″ W, 6″ D. Weight 7 pounds.

POWER REQUIREMENTS: 12 volts DC 300 ma. maximum, 150 ma. maximum without panel lights (switch provided)

DR-30 Receiver **$389.50**

SPECIAL TECHNICAL FEATURES

The DAVCO DR-30 is a double-conversion superhet which employs 38 solid-state devices in circuitry designed to give the maximum in performance and versatility. There are no compromises.

The DR-30 incorporates field-effect transistors in both the RF stage and the first mixer. These devices operate at high impedances and permit better image rejection, and their inherent low noise provides outstanding sensitivity in weak-signal reception. Their greatest advantage, however, is that cross-modulation and overloading from strong stations just aren't problems any more: the DR-30 sounds quiet between stations and weak signals just pop out of the background. This also eliminates the necessity for attenuating strong signals before they reach the RF stage, since this practice is undesirable in its effects on weak signals.

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Special toroid coils, used in the VFO and RF sections account in part for the compactness of the unit. For a given Q, a toroid is much smaller, requires less shielding, and is more stable than its normal counterpart.

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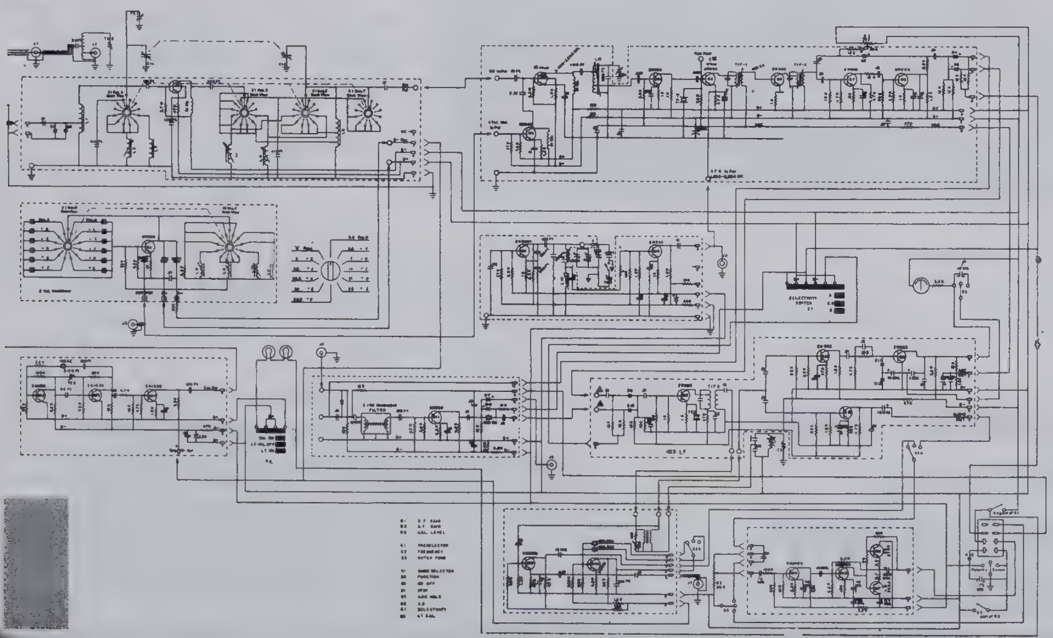

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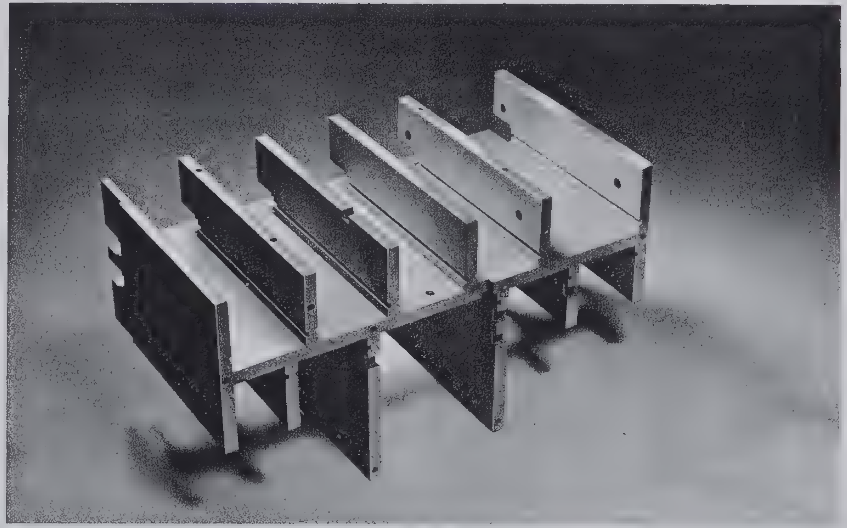

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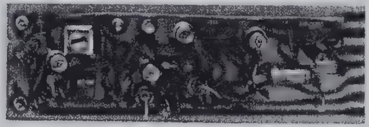

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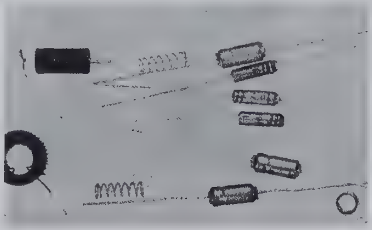

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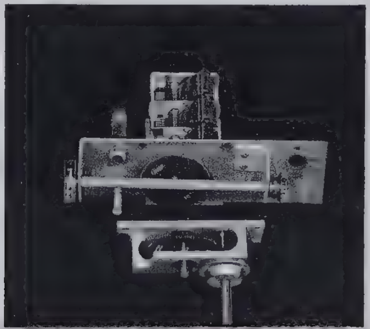

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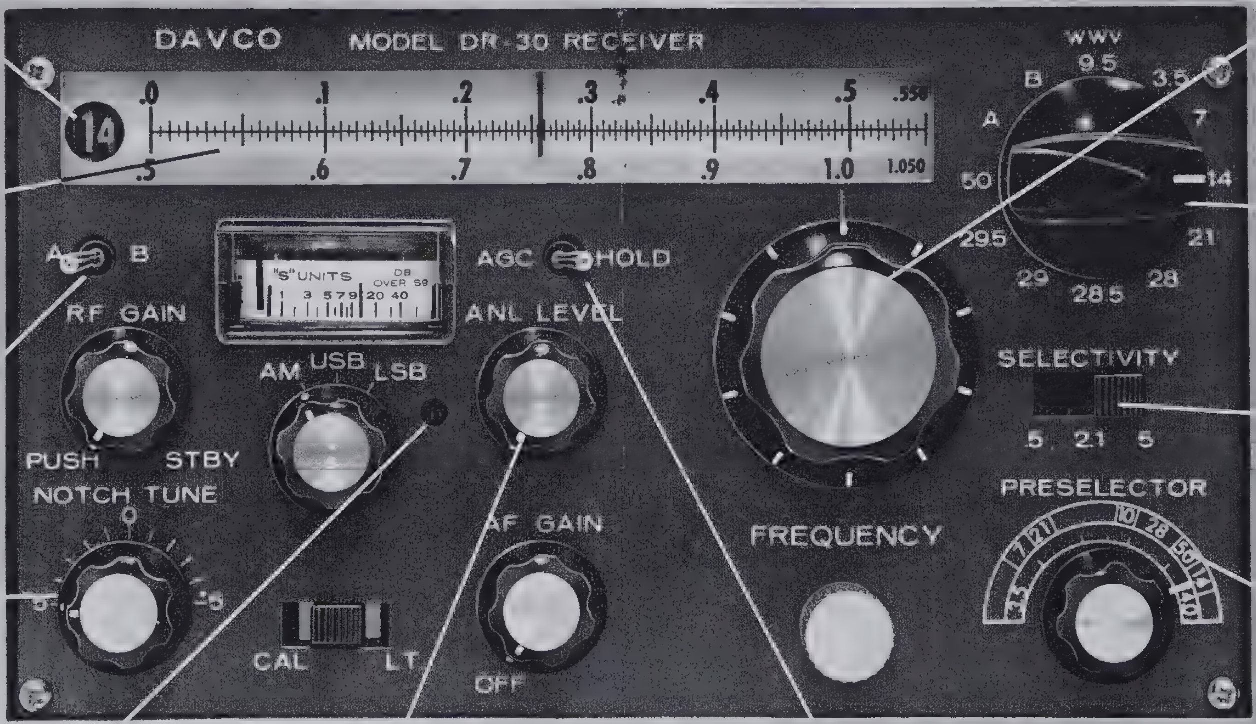

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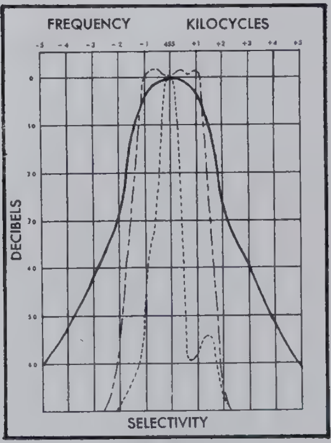

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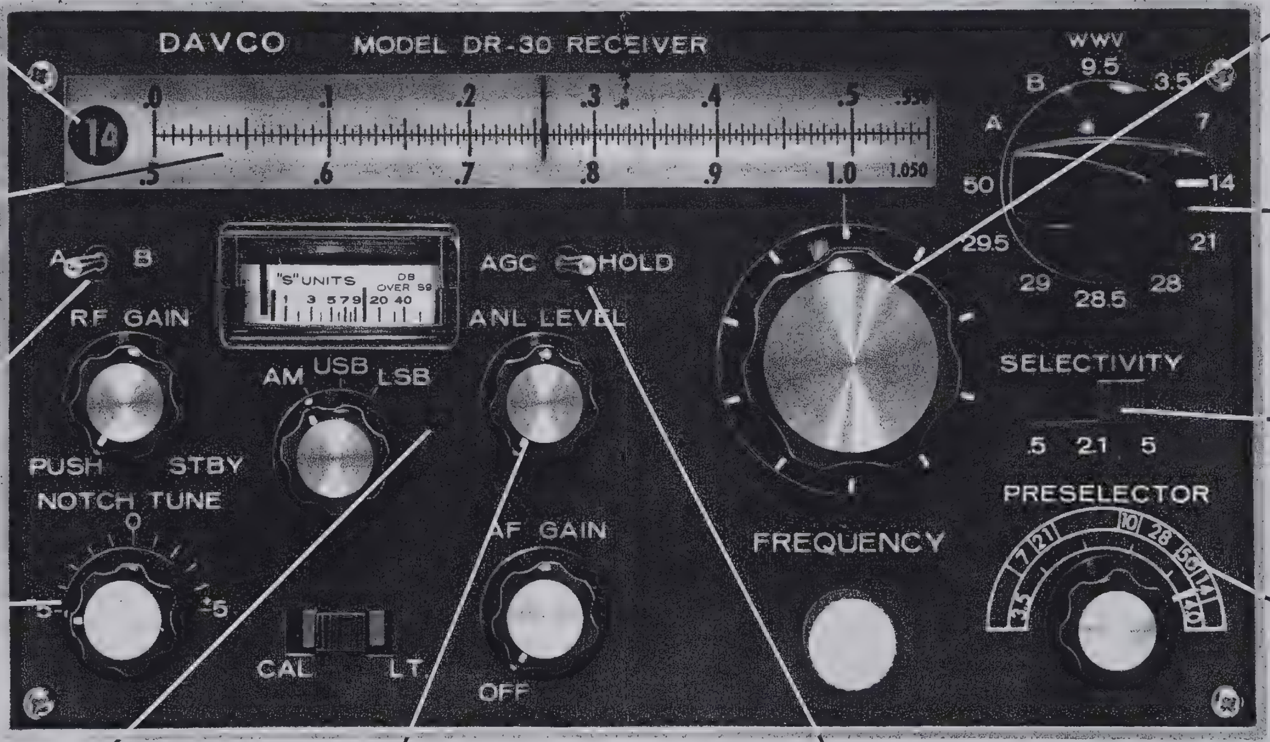

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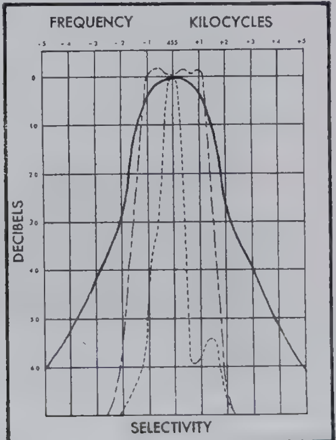

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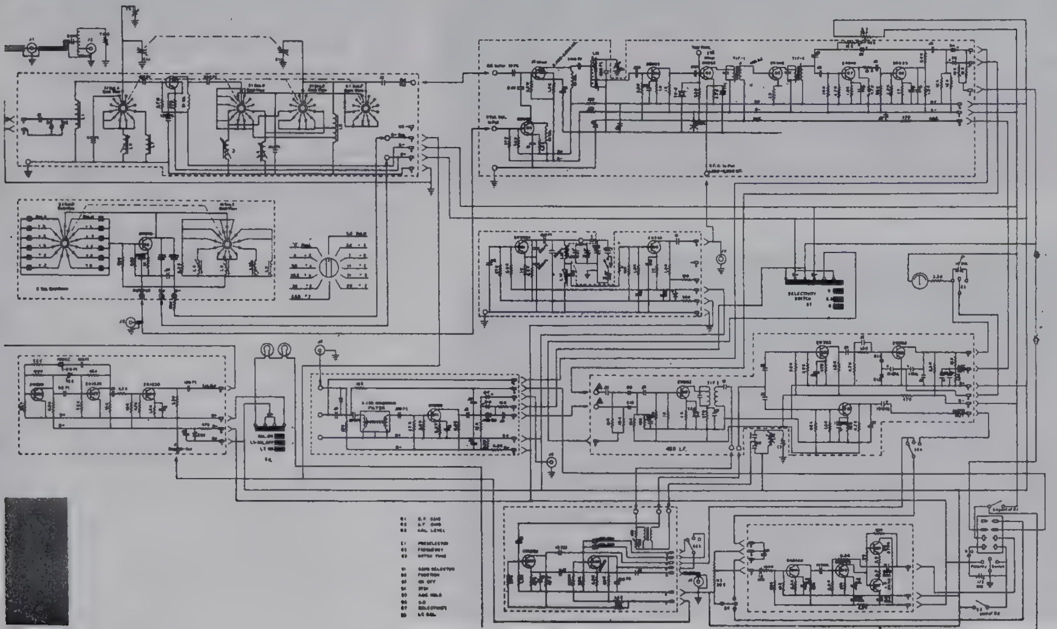

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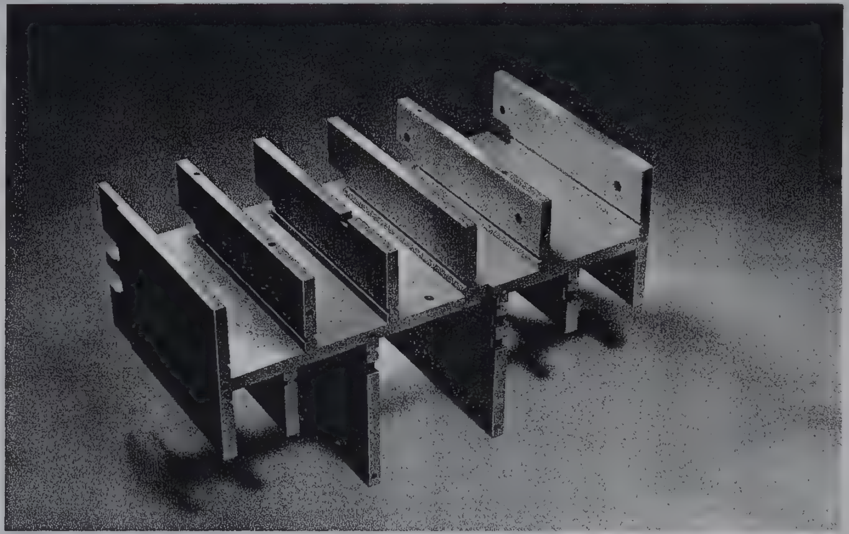

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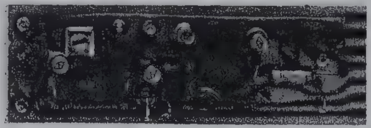

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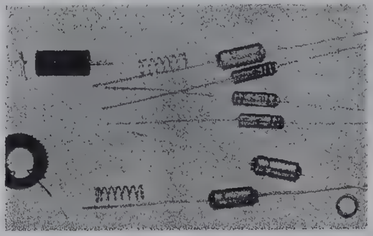

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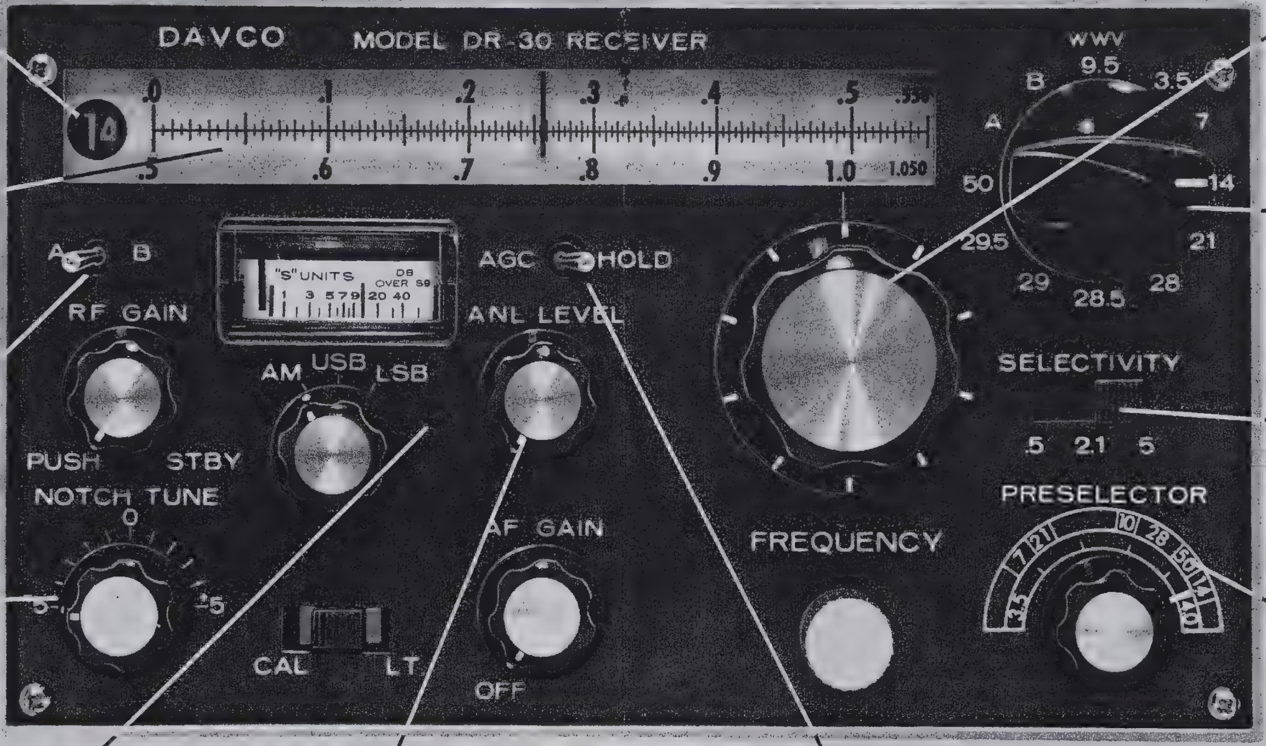

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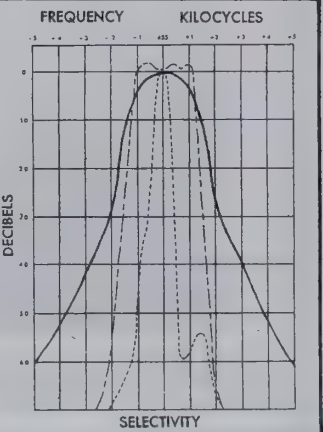

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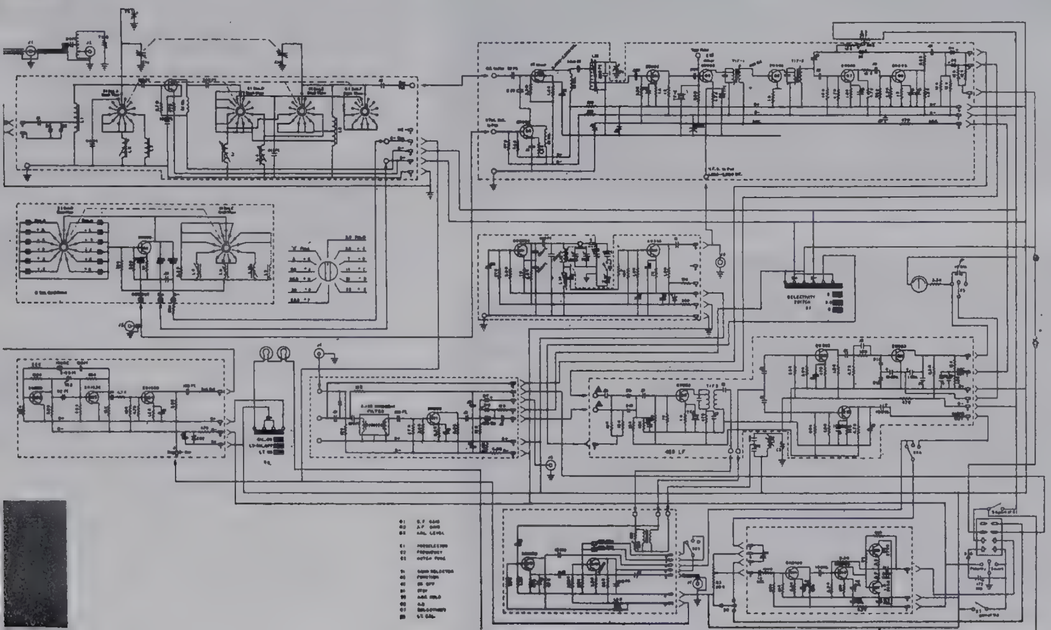

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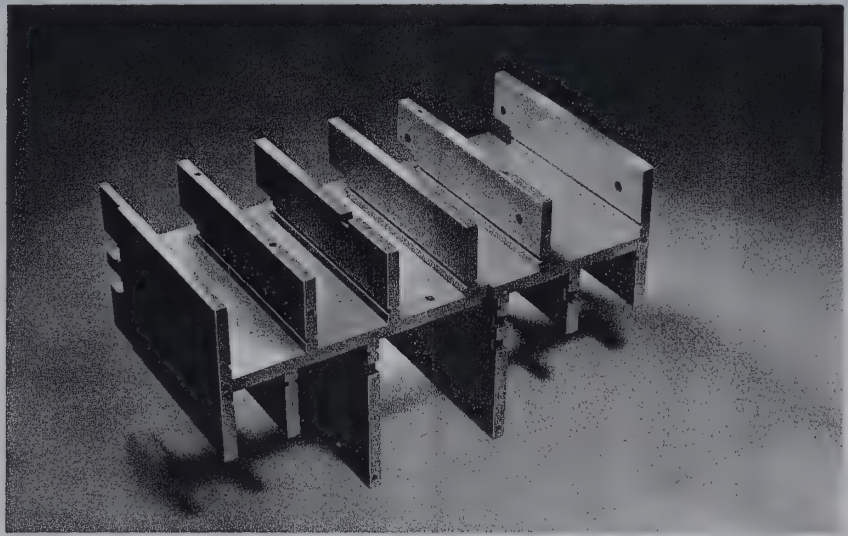

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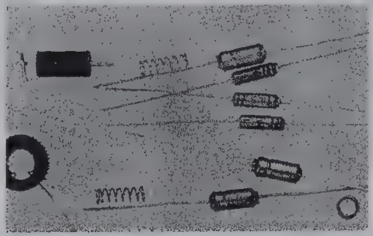

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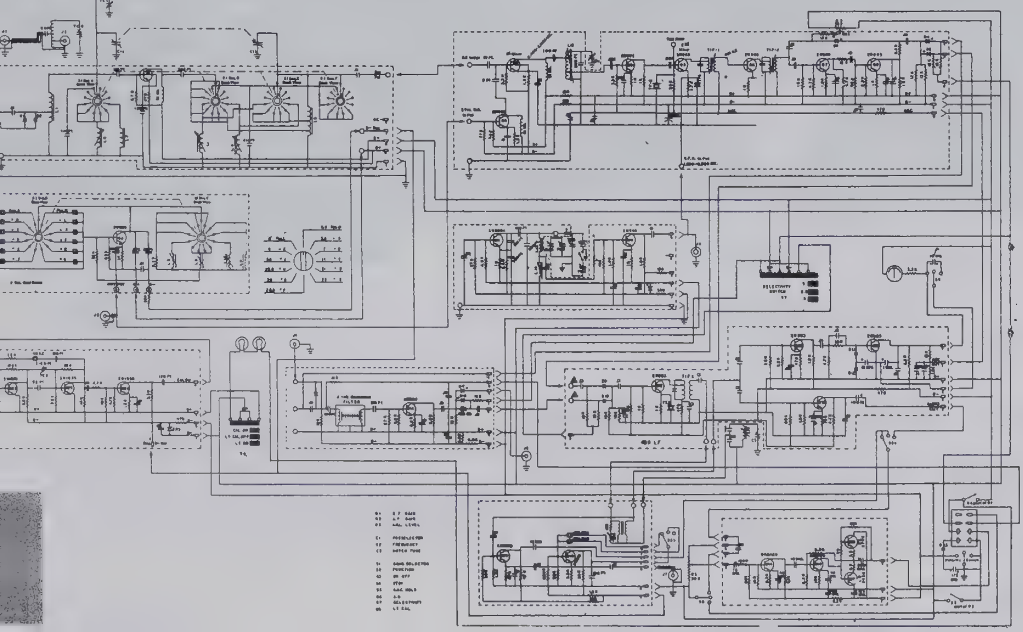

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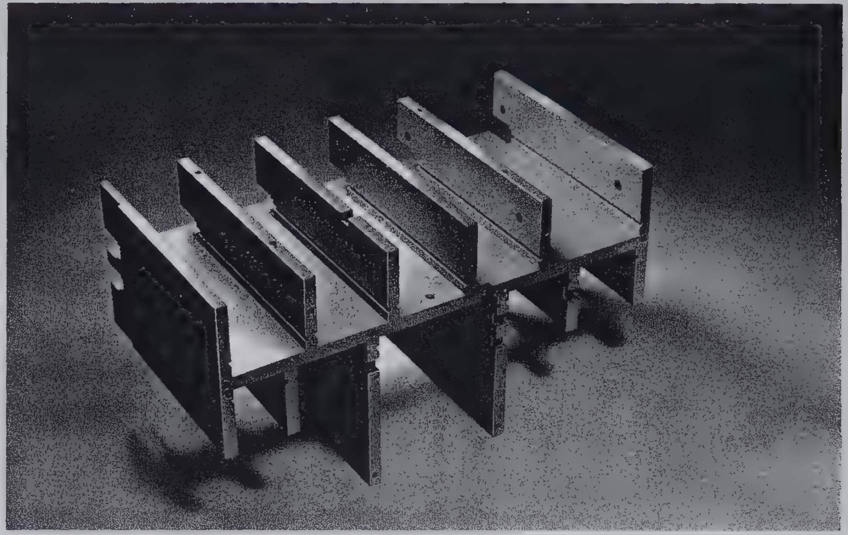

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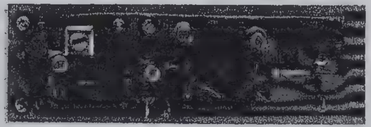
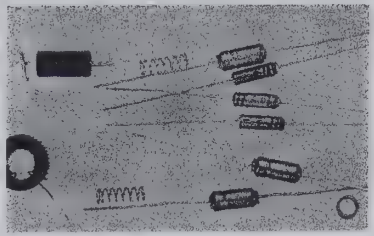
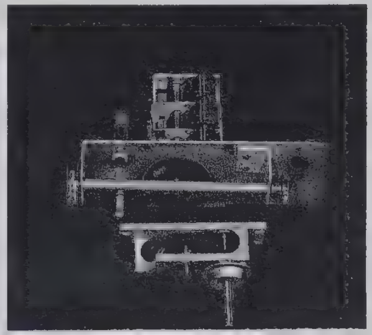


Another DAVCO "first" for ham radio. The circuitry of the DR-30 is contained on nine plug-in modules for easy access. Circuit boards are glass epoxy to match the ruggedness of the extruded chassis. No more hours of tracing and searching for individual circuits.



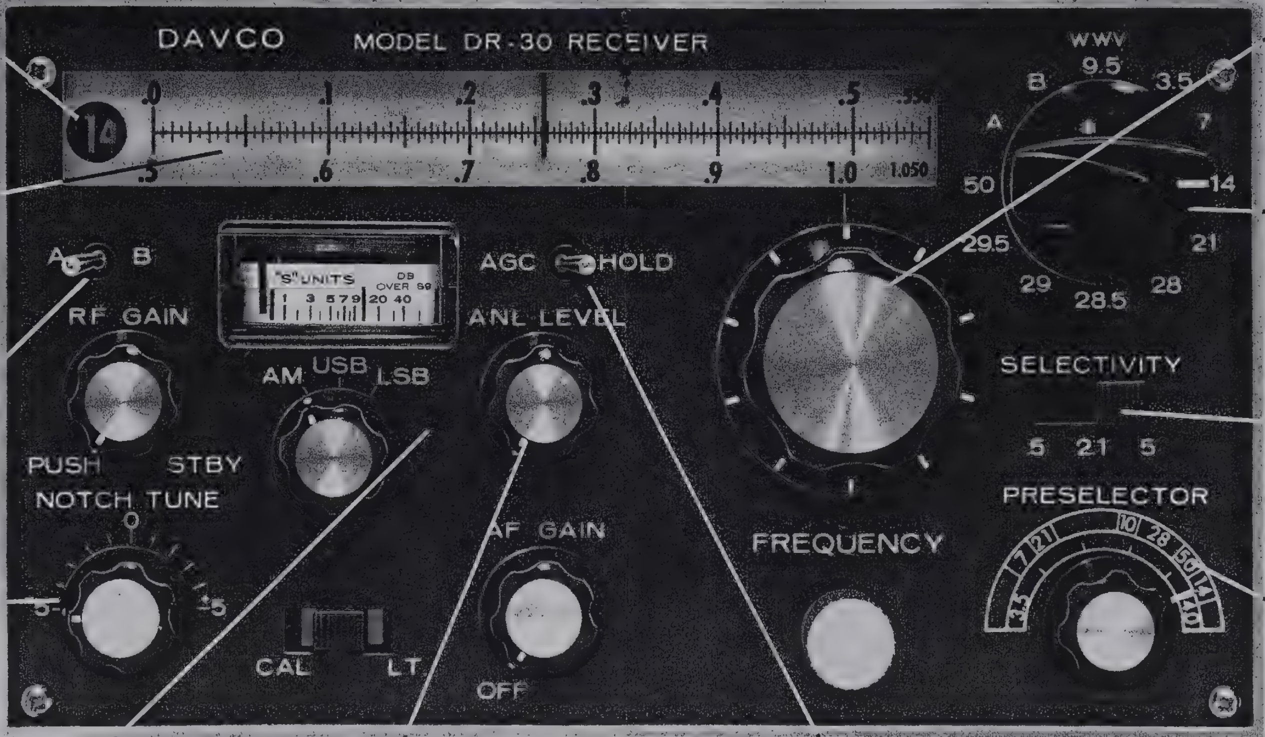
Only highest quality components are used throughout the DR-30 to assure you of years of trouble-free performance. All wiring features heat-resistant Teflon covered wire in case you can't resist the urge to tinker.



High-ratio, spring-loaded, split gears give s-m-o-o-t-h tuning and the slide rule dial indicator provides direct readout after calibration. The result—zero in on that SSB signal with the greatest of ease and know that you're "right on frequency".

THIS IS THE ACTUAL SIZE OF THE DAVCO

DR-30



1. Significant megacycle figure appears in this window allowing direct reading of frequency. If significant figure is black, the black scale (.0-.550MC) is used; if red, the red dial scale (5-1.050MC) is used.

2. Main tuning dial is same for all bands, not reverse reading. Assures accurate calibration of all bands. Overlap at top of frequency ranges permits DX-ing on 10 meters, some MARS coverage on 4MC, etc.

3. Toggle switch provides high-frequency audio roll-off (tone control) in "A" position, especially effective with wide selectivity and for foreign broadcast reception. "B" position connects to station accessory through Jones plug on rear if desired; can be used for phone patch, coax relay, external power supply or converter, etc.

4. Notch rejection filter is tunable across IF passband; gives up to 60db. rejection of unwanted carriers or whistle for QRM-free reception.

5. Dial calibration trimmer compensates for long-term aging. Superb stability of receiver eliminates constant dial juggling.

6. Noise limiter is blanking type, before main selectivity. Extremely effective on ignition-type noise and designed particularly for SSB and CW use.

7. Three-position switch selects hold time of AGC circuit; center no hold, left 200 msec., right 800 msec.

8. Main tuning knob is coupled to high precision dial mechanism. Incorporates ball bearings and spring-loaded split gears, for smooth, effortless tuning, zero backlash.

9. Receiver covers all of 80, 40, 20, 15, 10 meter bands first 550 kc. of 6 meter band, the 9.5-10.050 range for WWV and foreign broadcast, and two extra positions are available for installation of crystals for other ranges.

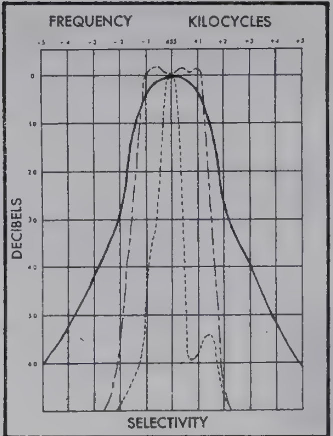
10. Your choice of selectivities: a wide one for AM, a Collins 2.1 kc mechanical filter for SSB and crowded band reception of AM, and a sharp crystal filter for CW.

11. Preselector tunes extremely high-Q circuits for maximum performance on each portion of each band. No compromise RF setting. Superb sensitivity on all bands.

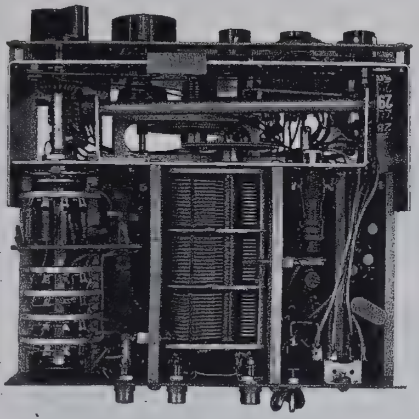
NEW, COMPACT, HIGH PERFORMANCE SOLID-STATE RECEIVER FOR AMATEUR APPLICATIONS FEATURING FIELD-EFFECT TRANSISTORS

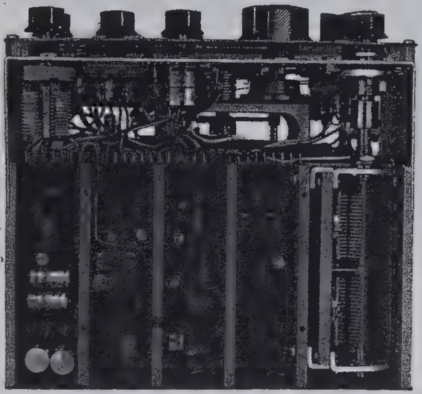
PROFESSIONAL USERS:

You are invited to communicate with us regarding your special receiver requirements. The DAVCO Model CV-30 is based upon the proven design and capabilities of the DR-30, but it is available in rack-mounted, portable or cased versions, with or without power supplies, with variable tuning or up to 24 crystal-controlled channels. We can provide units especially suited for WWV reception, radio astronomy, bio-telemetry, geophysical experiments, monitoring of communications channels, etc.



DAVCO DR-30
COMMUNICATIONS RECEIVER





NOW! The DR-30 receiver provides the extra performance and operating capabilities found only in the finest base-station receiver, combined with the rugged construction, tuning ease and compact size (4″ H x 7⅛″ W x 6″ D) of a mobile unit. DAVCO's "Amateur Engineered" DR-30 meets the challenges put to it by the most demanding amateurs, no matter the preference in bands or modes of operation, and is an excellent choice for fixed, mobile or portable operation.

FIELD-EFFECT RF STAGE: Field-Effect transistors are the revolutionary new solid-state devices that make cross-modulation and overloading problems a thing of the past; they also allow superior image rejection and extreme sensitivity for weak-signal reception.

FULL COVERAGE: Complete ham-band coverage of 80 through 10 meters, the first half-megacycle of 6 meters, WWV and the 31 meter SWL band on 9.50-10.050 Mc, and optional coverage of any two additional 550 kc segments between 3.5 and 54 Mc (for CB, MARS, further 6-meter coverage, etc.)

VARIABLE SELECTIVITY: Front-panel selection of your choice of a wide IF for AM reception (6 selective elements giving a nominal 5 kc bandwidth), or a Collins 2.1 kc mechanical filter for superb SSB selectivity, or an ultra-sharp crystal filter for crowded-band CW use.

DETECTORS: Linear AM detector, separate product detector for SSB and CW utilizing a crystal-controlled BFO and carrier generator for USB and LSB.

NOISE LIMITER: True blanking action occurs before selectivity lengthens noise pulses; extremely effective on power-line and ignition-type interference.

REJECTION NOTCH: Tunable notch provides more than 50 db rejection of undesired carrier. Pulls SSB and AM stations through under otherwise impossible conditions.

AGC: Full automatic gain control action on all modes, with selection of fast, medium or slow release time.

PLUS ALL THESE PERFORMANCE EXTRAS:

• Transmitter-type VFO • Crystal-controlled 1st oscillator • Separate RF and AF Gain controls
• Illuminated dial and S-meter • Built-in 100 kc. crystal calibrator
• Fully solid state—operates directly from 12-15 volts DC or accessory AC supply.

TECHNICAL DATA: DAVCO Model DR-30 Communications Receiver

Double conversion superhet, fully transistorized; crystal controlled first oscillator, ten crystals supplied for frequencies below:

3.5— 4.050 Mc
7.0— 7.550 Mc
9.5—10.050 Mc
14.0—14.550 Mc
21.0—21.550 Mc
28.0—28.550 Mc
28.5—29.050 Mc
29.0—29.550 Mc
29.5—30.050 Mc
50.0—50.550 Mc

plus two extra switch positions for other 550 kc segments optional.

SENSITIVITY: better than 1 μv for 10 db s/n; 1 μv for .3 watts audio.

SELECTIVITY: SSB: 2.1 kc Collins mechanical filter.
AM: nominal 5 kc broad IF.
CW: 200 cycle xtal filter in series with mechanical filter for improved skirt rejection.

STABILITY: negligible warm-up change; less than 100 cps change per hour; less than 25 cps for 20% power supply variation.

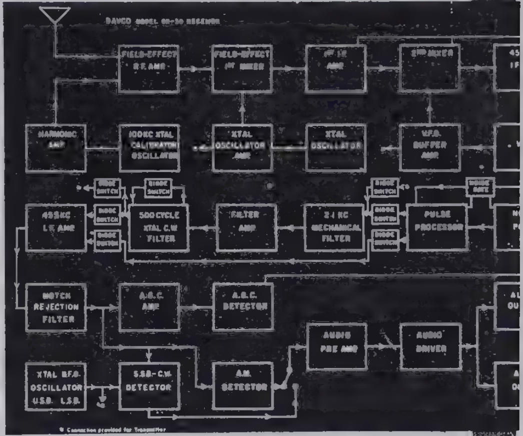
TUNING: spring-loaded split-gear drive unit, backlash-free; flywheel loading for large band excursions; adjustable dial drag and lock.

CALIBRATION: internal 100 kc crystal calibrator supplied; slide-rule dial has 5 kc markings, hairline pointer; tuning knob has 2 kc marks on perimeter; internal frequency shift for sideband compensation.

SPURIOUS RESPONSES: images and IF down at least 60 db below 22 Mc, at least 35 db 22-54 Mc Internal spurious less than equivalent 1 uv signal at input in ham bands.

FREQUENCY READOUT: significant figure (Mc) appears in indicator window, is color coded as to whether .000-.550 Mc or .500-1.050 section is in use. Can provide direct calibration with accessory crystals.

DETECTORS: linear AM detector; separate product detector for SSB and CW; crystal controlled BFO-carrier generator for USB and LSB.



AGC: full action on all modes of operation; has fast-attack characteristic; panel switch selects fast release (.015 seconds) for AM or break-in, medium (.2 sec.) or slow release (.8 sec) for SSB and CW. Audio output varies 8 db for 80 db change in RF input. AGC action is delayed to 5 microvolts.

NOISE LIMITER: true blanking type action occurs before selectivity lengthens pulses; has separate ANL amplifier and detector, diode noise gate. Front panel control.

RF STAGE: low-noise premium field-effect RF amplifier and mixer; input and output circuits employ high-Q toroidal inductors.

REJECTION NOTCH: tunable notch provides up to 60 db rejection of undesired carrier.

INTERMEDIATE FREQUENCIES: 1st IF: 2.405-2.955 Mc (variable, tracked), 2nd IF: 455 kc.

SEMICONDUCTOR COMPLEMENT:
23 bi-polar transistors
2 field-effect transistors
10 signal diodes
1 power diode
2 zener regulator diodes

AUDIO: .6 watt at 5% distortion; max 1 watt. Output impedance 8 to 45 ohms speaker; 600 ohm earphones preferred.

SIZE: 4″ H, 7⅛″ W, 6″ D. Weight 7 pounds.

POWER REQUIREMENTS: 12 volts DC 300 ma. maximum, 150 ma. maximum without panel lights (switch provided)

DR-30 Receiver **$389.50**

DAVCO
ELECTRONICS, INC.

DAVCO's Design Philosophy

Through a philosophy — both imaginative and conservative — which combines the newest, improved components with the most sophisticated circuit techniques, DAVCO has been able to conceive and produce some of the finest equipment available to the amateur today.

Our constant and continuing attention to the requirements of the amateur fraternity and our use of only the highest quality materials result in equipment which provides full performance capability . . . great pleasure and confidence in operation . . . and full flexibility for the amateur's every application.

DAVCO ELECTRONICS, INC.
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304

The DR-30 is available direct from the factory. The price of $389.50 includes shipping costs within the U.S.A. A time payment plan requiring 10% down payment is available. Export orders receive prompt attention, and there is no charge for export packaging.

Extra crystals can be installed at the factory in the A and B bandswitch positions covering any 550 kc. ranges between 3.5 and 54 megacycles. The charge is $6.00 per crystal. Crystals can also be user-installed.

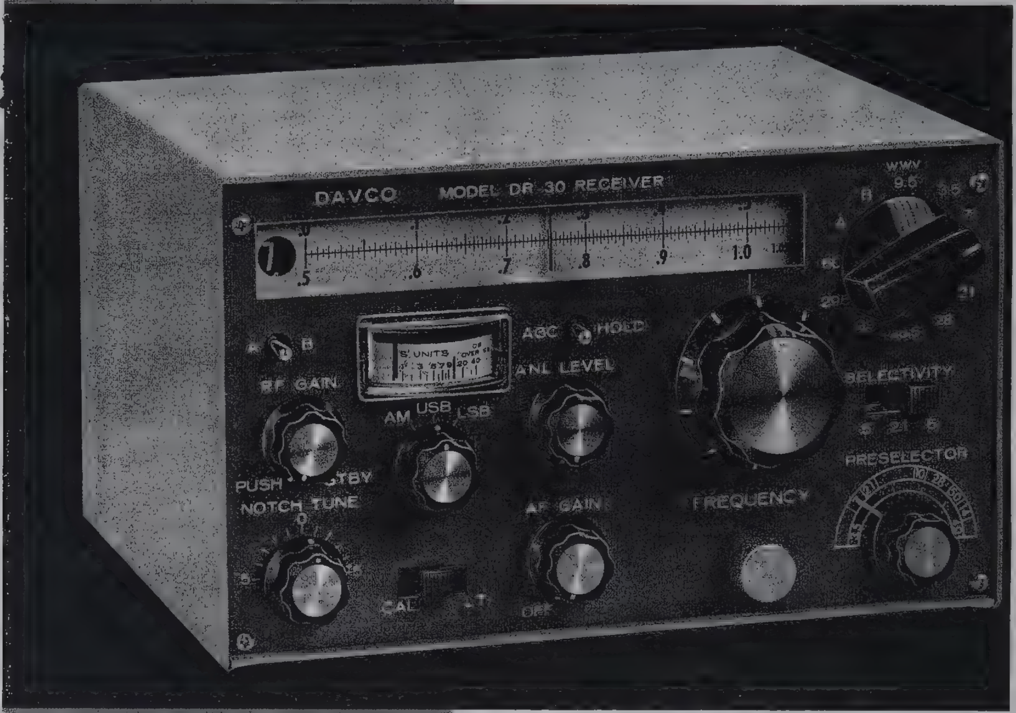
Substitution of ranges other than those provided in the standard DR-30 can be made at extra charge. Please write stating your requirements. For calibration, it is desirable that any extra or substituted bands start on the megacycle or the half-megacycle. Coverage of the CB range can be accomplished by a single crystal providing 26.9 Mc-27-450 Mc. coverage, but a correction of exactly 100 kc. will have to be applied to the frequency reading.

The DR-30 is fully guaranteed for 6 months.

DAVCO

DR 30

COMMUNICATIONS RECEIVER



DAVCO ELECTRONICS, INC.
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304
Phone: 224-4322 (area code 904)

A high performance, dual-conversion, communications receiver for amateur applications utilizing solid-state components and featuring field-effect transistor RF stage for greater sensitivity, better image rejection and exceptional freedom from cross modulation or overloading on strong signals. The DR-30 provides the maximum in communication effectiveness under the most rigorous operating conditions. Full amateur band coverage on SSB, CW or AM, Collins mechanical filter, crystal stability and extra built-in QRM-cutting features make the DAVCO DR-30 the finest and most reliable receiver for use on today's crowded bands.

Semiconductors

BOX 20912 • PHOENIX, ARIZONA 85036

3N128

D

DAVCO MIX SUBSTITUTE for K1004

N-Channel depletion

SILICON N-CHANNEL MOS FIELD EFFECT TRANSISTOR

. . . designed for VHF amplifier and oscillator applications in communications equipment.

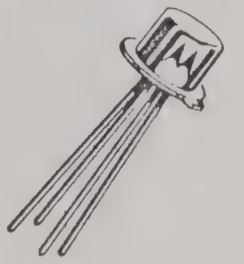
- High Forward Transadmittance –
  $|y_{fs}|$ = 5000 µmhos (Min) @ f = 1.0 kHz
- Low Input Capacitance –
  C_{iss} = 7.0 pF (Max) @ f = 1.0 MHz
- Low Noise Figure –
  NF = 5.0 dB (Max) @ f = 200 MHz
- High Power Gain –
  P_G = 13.5 dB (Min) @ f = 200 MHz
- Complete "y" Parameter Curves
- Third Order Intermodulation Distortion Performance Curve Provided

① Requires only −3V V_{g-s} to cut off. old K1004

N-CHANNEL MOS FIELD-EFFECT TRANSISTOR

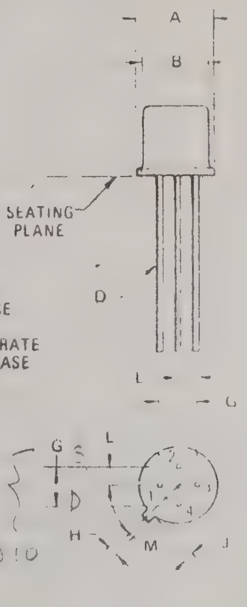
required up to 17V

② exchange pins 1+2



Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	+20	Vdc
Drain-Gate Voltage	V_{DG}	+20	Vdc
Gate-Source Voltage	V_{GS}	±10	Vdc
Drain Current	I_D	50	mAdc
Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	330 2.2	mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +175	°C

*Indicates JEDEC Registered Data.



PIN 1. DRAIN
2. SOURCE
3. GATE
4. SUBSTRATE and CASE

exchange for DAVCO MIX RADIO

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.209	0.230	5.310	5.840
B	0.178	0.195	4.520	4.950
C	0.170	0.210	4.320	5.330
D	0.016	0.019	0.406	0.483
G	0.100 TYP		2.54 TYP	
H	0.036	0.045	0.914	1.140
J	0.028	0.048	0.711	1.220
K	0.500		12.700	
L	0.050 TYP		1.270 TYP	
M	45° TYP		45° TYP	

All JEDEC dimensions and notes apply

CASE 20(7)

MOS field effect transistors have extremely high input resistance. They can be damaged by the accumulation of excess static charge. Avoid possible damage to the devices while handling, testing, or in actual operation, by following the procedures outlined below:

1. To avoid the build-up of static charge, the leads of the devices should remain shorted together with a metal ring except when being tested or used.
2. Avoid unnecessary handling. Pick up devices by the case instead of the leads.
3. Do not insert or remove devices from circuits with the power on because transient voltages may cause permanent damage to the devices.

.005
c.005000

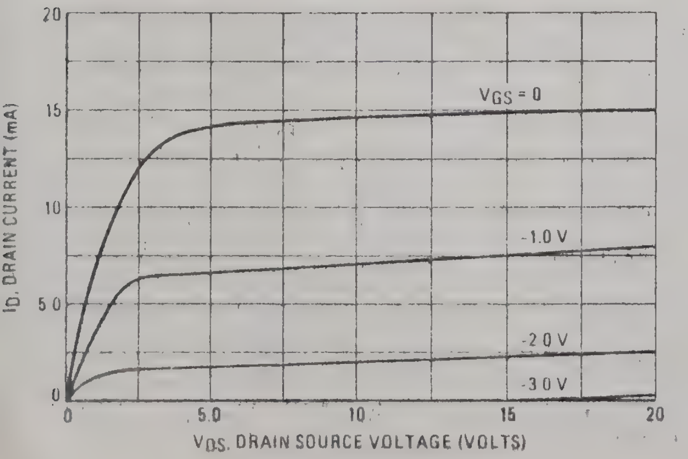
ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted)

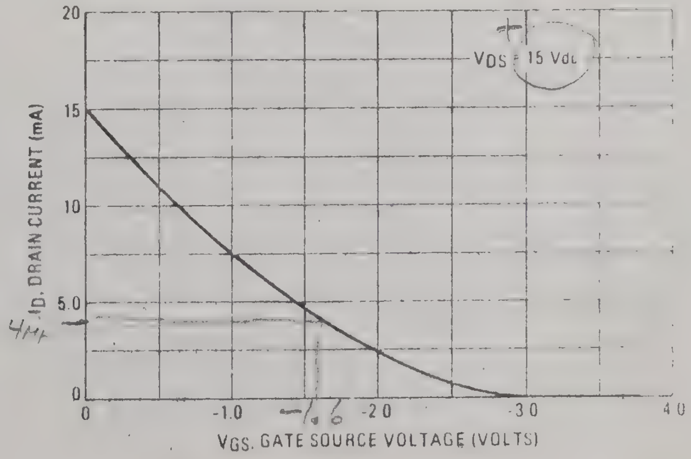
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Gate Source Breakdown Voltage (I_G = -10 μAdc, V_{DS} = 0)	$V_{(BR)GSS}$	-50	–	Vdc
Gate-Source Cutoff Voltage (V_{DS} = 15 Vdc, I_D = 50 μAdc)	$V_{GS(off)}$	-0.5	-8.0	Vdc
Gate Reverse Current	I_{GSS}			nAdc
(V_{GS} = -8.0 Vdc, V_{DS} = 0)		–	0.05	
(V_{GS} = -8.0 Vdc, V_{DS} = 0, T_A = 125°C)		–	5.0	
[illegible]				
Zero-Gate-Voltage Drain Current (1) (V_{DS} = 15 Vdc, V_{GS} = 0)	I_{DSS}	5.0	25	mAdc
[illegible]				
Forward Transadmittance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 kHz)	$\|y_{fs}\|$	5000	12,000	μmhos
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{fs})$	5000	–	μmhos
Output Conductance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{os})$	–	500	μmhos
Input Conductance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{is})$	–	800	μmhos
Input Capacitance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 MHz)	C_{iss}	–	7.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 MHz)	C_{rss}	–	0.28	pF
Noise Figure (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	NF	–	5.0	dB
Power Gain (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	P_G	13.5	–	dB

*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

[illegible]





TYPICAL 1 kHz DRAIN CHARACTERISTICS

[illegible]

FIGURE 3 — FORWARD TRANSADMITTANCE versus GATE BIAS VOLTAGE

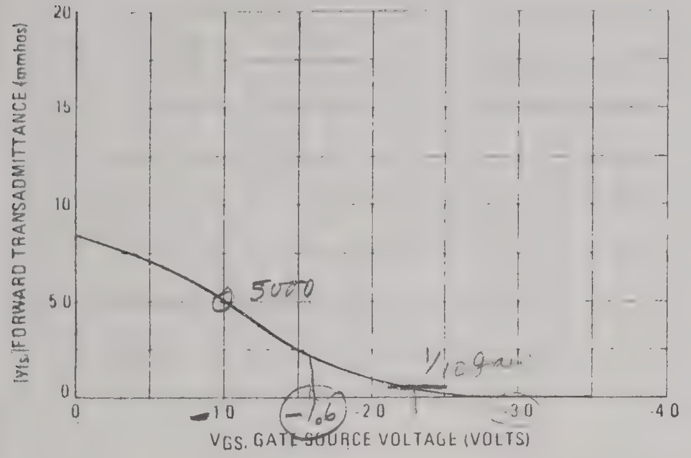
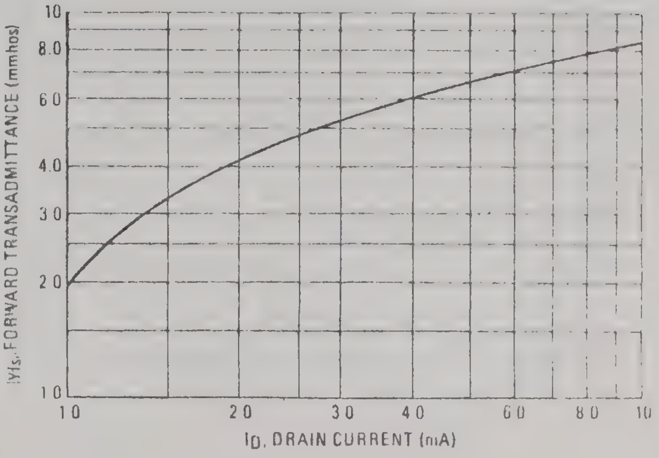
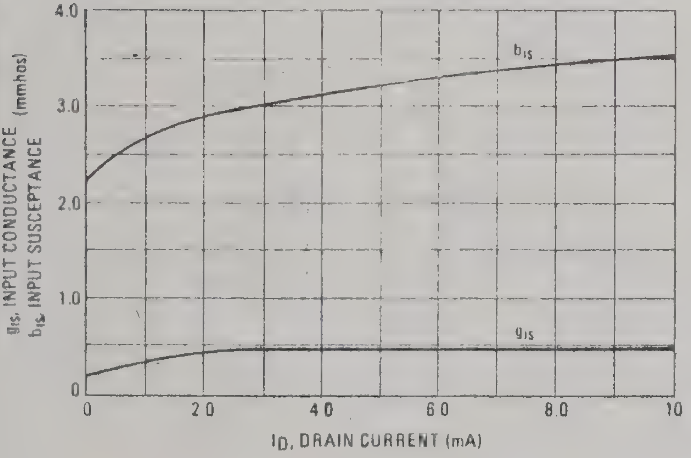
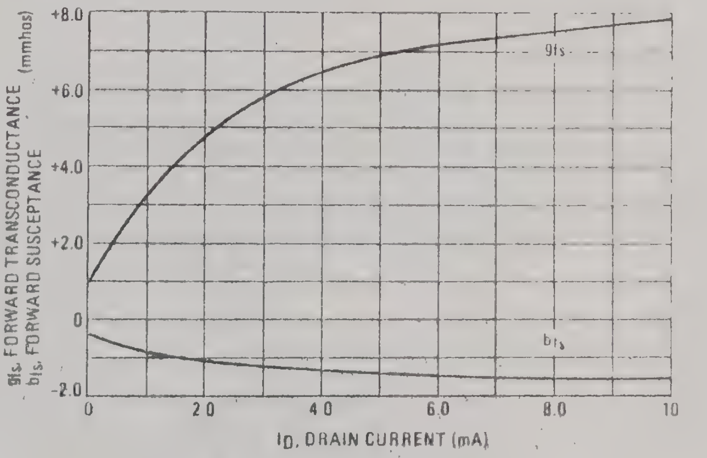


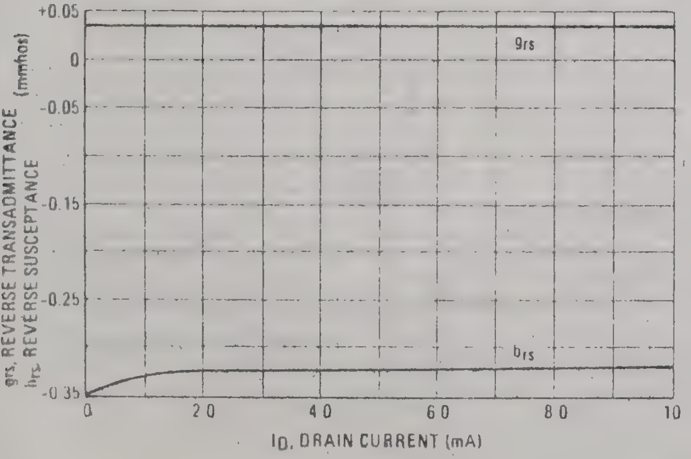
FIGURE 4 — FORWARD TRANSADMITTANCE versus DRAIN CURRENT



TYPICAL [illegible]







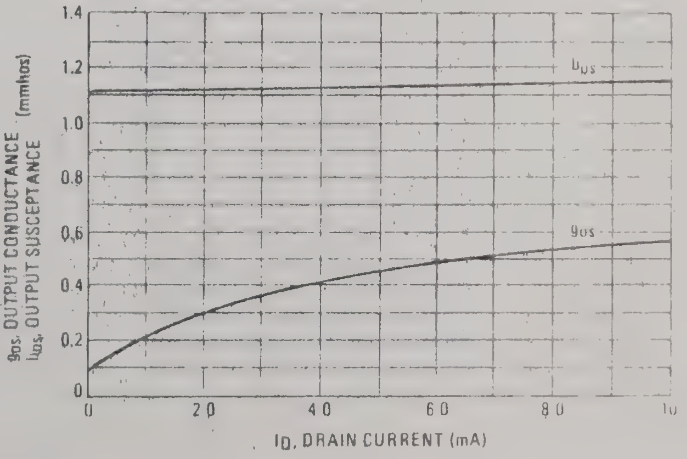


FIGURE 9 – POWER GAIN AND NOISE FIGURE versus DRAIN CURRENT

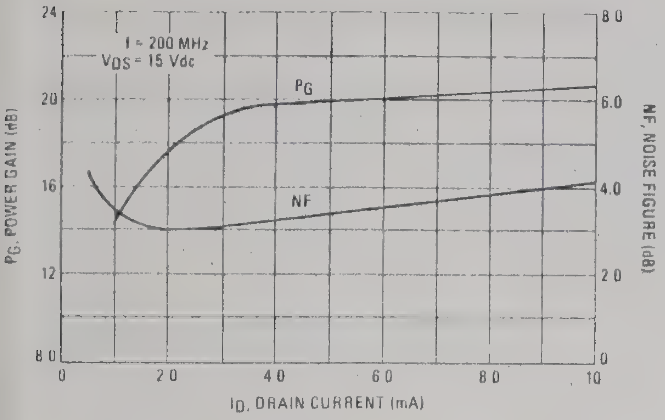


FIGURE 10 – POWER GAIN AND NOISE FIGURE versus DRAIN VOLTAGE

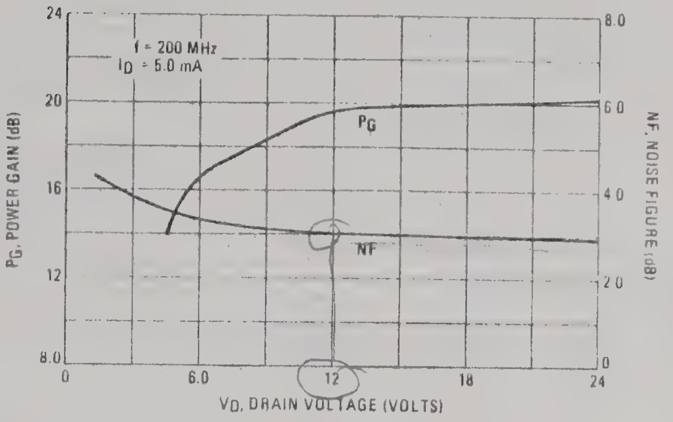


FIGURE 11 – [illegible]

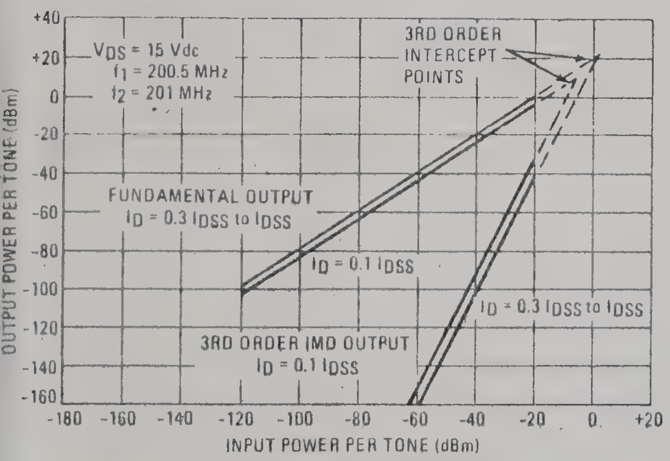
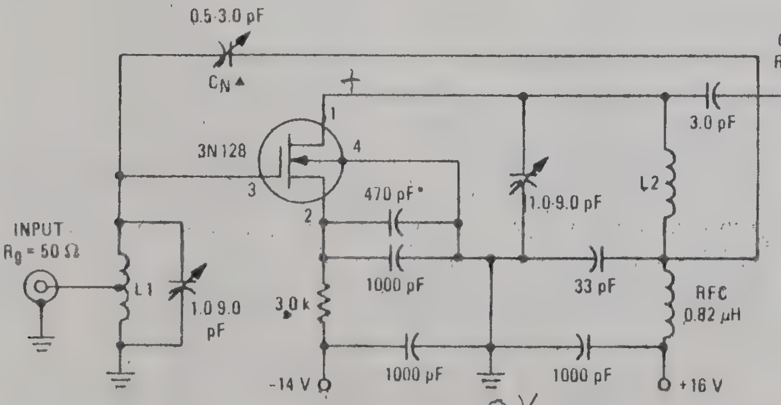


Figure 11 shows the typical third order intermodulation distortion (IMD) performance of the 3N128 at 200 MHz.

Both fundamental output and third order IMD output characteristics are plotted. The curves have been extrapolated to show the third order intermodulation output intercept point.

Performance for drain currents from I_{DSS} to 0.1 I_{DSS}, is given. The power gain and noise figure test amplifier shown in Figure 12 was used to generate the IMD data.



L1 = 4-1/2 turns #20 AWG wire, 3/16" diameter, approximately 1/2" long, tapped 1 turn from ground end.

L2 = 3-1/2 turns #20 AWG wire, 3/8" diameter, approximately 1/2" long

*Leadless-type disc capacitor

▲Neutralization fixed for a Transistor having a Typical value of C_{rss} (0.13 pF)

0 V

-1.6 4mA

-3.0 V Cut off Drain Current

© MOTOROLA INC. 1972

K1001
K1002 K1004

VHF
INSULATED GATE
FIELD EFFECT
TRANSISTOR

N-CHANNEL
DEPLETION

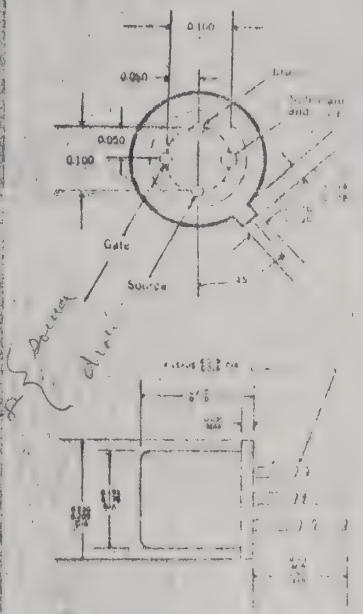
GENERAL DESCRIPTION

The K1001, K1002 and K1004 are N-Channel insulated-gate (MOS) field effect transistors featuring extremely high input impedance. A TO-18 package is used with a fourth lead connected to the case and substrate. These devices are N-Channel depletion.

ABSOLUTE MAXIMUM RATINGS

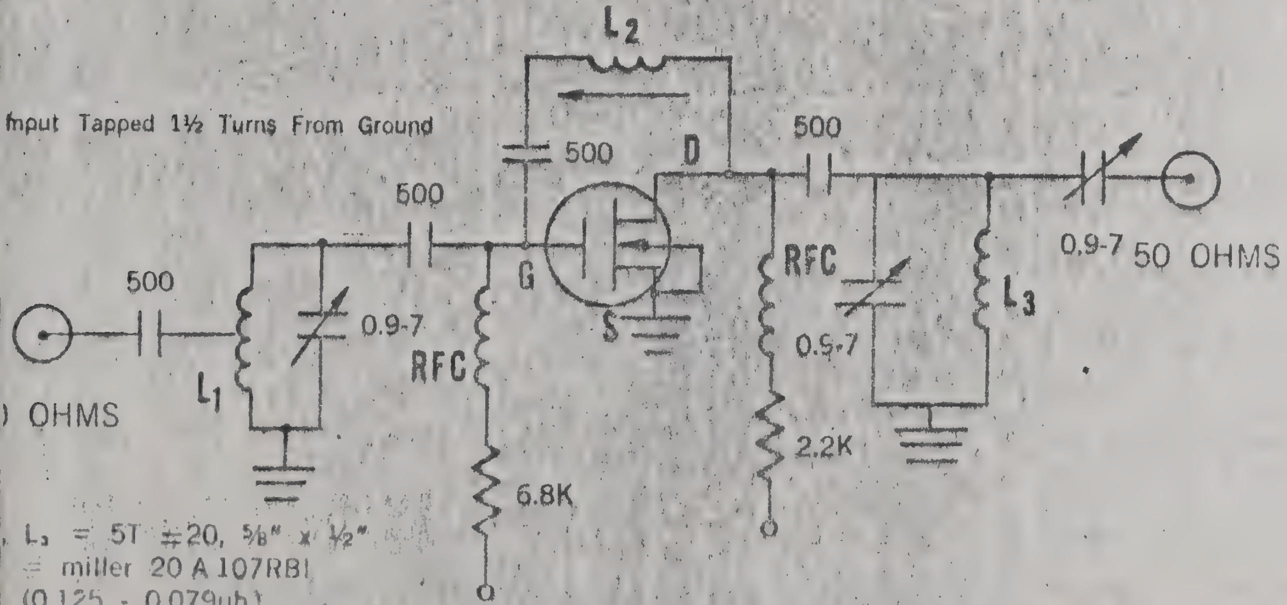
Maximum Temperatures	
Operating Junction Temperature	175°C
Storage Temperature	—55°C to 175°C
Maximum Power Dissipation at 25°C Case	150 mw
Maximum Voltages	
V_{ds} (Drain to source voltage)	15 volts
V_{gs} (Gate to source voltage)	±50 volts
Maximum Drain Current (I_d)	40 ma

NOT 3N128



K1001
K1002 K1004

FIG. I



Input Tapped 1½ Turns From Ground

, L₃ = 5T #20, ⅝" x ½"
= miller 20 A 107RBI
(0.125 - 0.079uh)

OTE: ALL CAPACITANCES SHOWN ARE pf.

K1001 K1002 K1004

ELECTRICAL CHARACTERISTICS @ 25°C

	K1001			K1002			K1004			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	UNITS
Zero-gate-voltage drain current, I_{do} $V_{GS} = 0, V_{DS} = \mp 10$v.	5	7	12	0.5	3	5	0.5	4	7	ma
Zero-gate-voltage drain-to-source resistance, r_{do} $V_{GS} = 0, V_{DS} = 10$v., f = 1 kc	2K	3K	10K	2K	3K	10K	1K	3K	10K	ohms
Zero-gate-voltage gate-to-drain transconductance, g_m @ $V_{GS} = 0, V_{DS} = 10$v., f = 1 kc	2,000	3,000	—	1,500	2,000	—	800	2,000	—	umhos
Gate-to-source-leakage resistance, r_{gs} $V_{GS} = 15$v., $V_{DS} = 0$	10^{12}	10^{14}	—	10^{12}	10^{14}	—	10^{12}	10^{14}	— x 1/10	ohms
Gate-to-source cutoff voltage, V (off) 2 $g_m = 1/10\ g_{mo}$, $V_{DS} = 10$v., f = 1 kc	—	4	6	—	4	6	—	4 200MHz	12	volts
Channel resistance, r_c $V_{GS} = 0, V_{DS} = 1.0$v.	—	300	500	—	400	700	—	400	1000	ohms
200 Mc Power Gain, P_G NOTE 1 $V_{DS} = 10$v., NOTE 2 Rg = 50 ohms	10	12	—	8	10	—	6	10	—	db
200 Mc Noise Figure, NF NOTE 1 $V_{DS} = 10$V, NOTE 2 Rg = 50 ohms	—	4	4.5	—	4.5	6	—	5	8	db
Gate-Source Capacitance C_{gs}	—	3	4.5	—	3	4.5	—	2	4.5	pf
Gate-Drain Capacitance C_{gd} $\left(Y_{RS} @ \begin{matrix} V_{gs} = 0V \\ V_{DS} = 10V \end{matrix}\right)$	—	0.5	0.7	—	0.5	0.7	—	0.5	0.7	pf
Source-Drain Capacitance C_{ds} $\begin{matrix} V_{gs} = 0V \\ V_{DS} = 10V \end{matrix}$	—	1.5	2.2	—	1.5	2.2	—	1.5	2.2	pf

NOTE 1. As tested in 200mc circuit (See Figure 1).

NOTE 2: I_{DS} (ma) for power gain and noise figure is determined by device.

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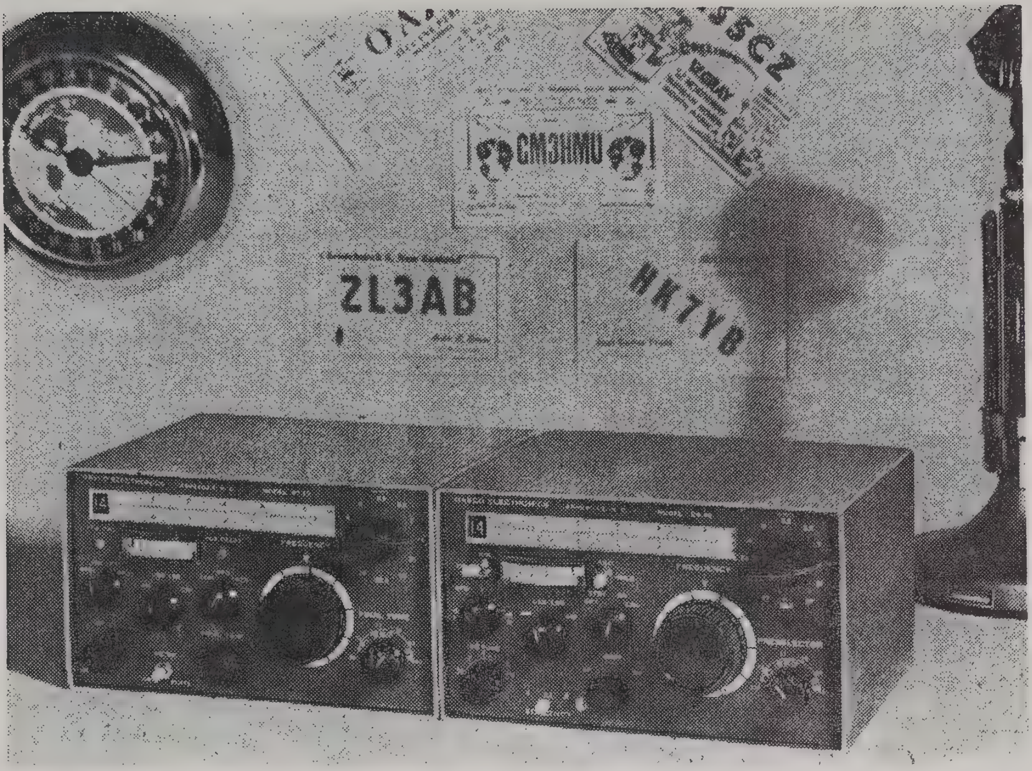
DT20 DR30



DAVCO

113 Norwood Ave., Asheville, N. C.

$571±

Two thousand designers—that would be quite a staff for any company. But that's how many hams we talked with before deciding what our new line of equipment should offer. They said they wanted transceiver convenience, but separate VFO's for chasing DX; we gave them both. They needed all the bands, not only for ragchewing on the high bands but because the sunspots won't be uncooperative forever; we put in *full* coverage of 80 through 10, even the foreign segments, and then some. Is 6-meter coverage too much to expect? We don't think so. Think what that means! They asked for AM & CW, along with the high-performance SSB, so we provided three positions of receiver selectivity, including a Collins mechanical filter and a CW crystal filter, and worked out good keying characteristics on the transmitter. Of course they insisted upon good stability; we had to work a long time to provide it at the temperature extremes they encounter. Almost everybody would add a crystal calibrator, so we did it for them and even provided WWV coverage. They asked for a transmitter power level which wouldn't require overhauling of the electrical system of the family bus, yet they wanted enough for a really emphatic signal mobiling and enough to drive a linear back home. Oh, they asked for lots of things; we put in independent broadcast coverage, a built-in VOX, selectable AGC time constants, extra band positions for MARS, etc., a crystal controlled carrier generator and BFO for USB and LSB, a tuning ratio that gives 10 kc to a turn, and everything else that you expect. Then we made plug-in subassemblies of all this, held them together with a really rugged (and heavy) chassis, and wrapped it all in fiberglass cabinets that don't shrink from field-day duty.

We had to borrow freely of the components and techniques of the computer-and-missile crowd in order to do all of this, and we don't quite know how to characterize the results. In pure performance and versatility, the DAVCO DR-30 and DT-20 must be ranked with the best fixed-station rigs, but the small size and ease of operation make them quite logical mobile or portable rig choices. And what an outfit for DX-peditions (besides the performance, hand luggage goes through customs a lot easier!)

Our 2000 friends gave us quite an assignment, and it took us darned near three years to fill it. We sincerely hope that the results are a significant contribution to the application of space-age technology to the amateur field.

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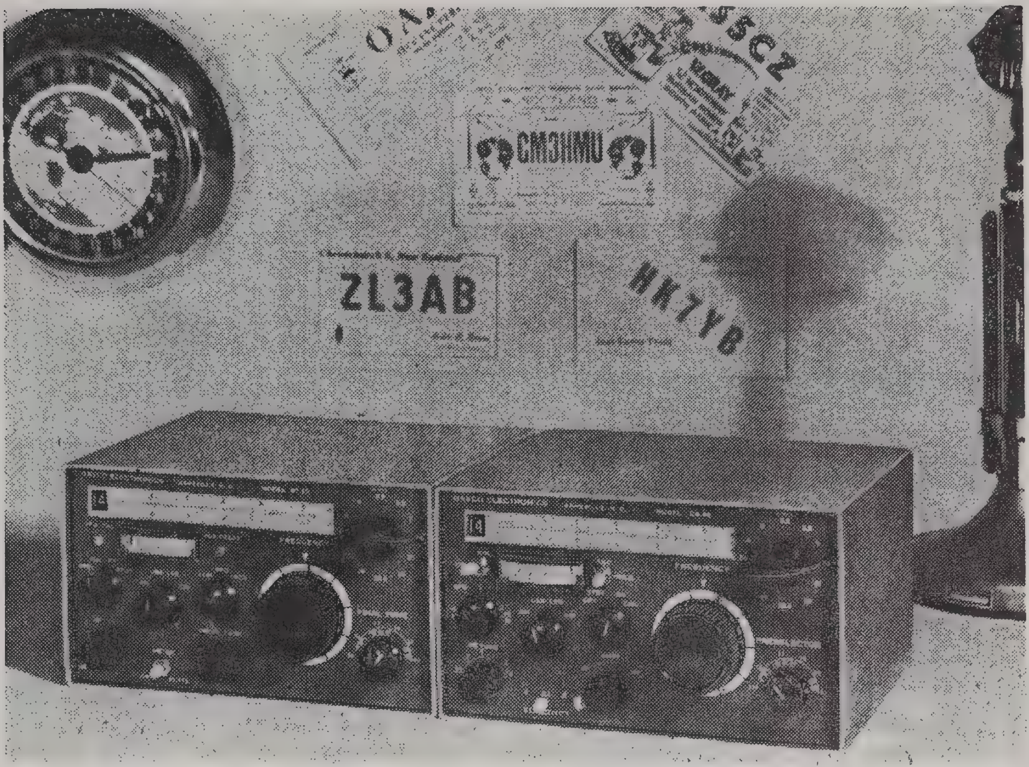
DT20 DR30



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DAVCO ELECTRONICS INC.

JAMES F. LOVETTE
AREA CODE 305
PHONE 224-4322

P. O. BOX 2677
2024 S. MONROE ST.
TALLAHASSEE, FLORIDA

Preliminary instruction booklet

DAVCO ELECTRONICS, INC.

Model DR-30 Communications Receiver

You have chosen one of the finest pieces of electronics equipment available. Like most radio receivers, this one can be operated with a minimum of experience or skill, and better-than-average results will be acheived. The provision of a slow tuning rate, effective Automatic Gain Control and excellent selectivity assure excellent performance under normal conditions. However, the possibility of operation under marginal conditions of noise, band crowding and weak signals offers a challenge to equipment and operator alike: the DR-30 is designed specifically to meet these conditions and you, the operator, can quickly learn your part of the operation.

We suggest that you read very carefully the sections which follow on connecting your receiver , and follow the instructions. Once you have the unit operative, you might want to connect it to some antenna or piece of wire and simply experiment. Try all the controls: see what they do. Listen to amateurs, foreign broadcast stations, WWV, and transmissions on AM and CW and SSB. After a few minutes of this, you'll be better versed for a careful reading of the more elaborate description of control functions and circuit operation which follows. By a thorough understanding of each receiver feature, you'll be able to take advantage of the highly unusual capabilities of the equipment. You'll find an almost unlimited number of tuning techniques for meeting any imaginable condition.

Your DR-30 receiver is a precision instrument which uses the latest state-of-the-art design features. Your experiences with it will allow it to earn your respect. Enjoy using it; put it to all the tests. You'll continue to be happy with its versatility, its reliability, and its superlative performance.

BEFORE OPERATION

UNPACKING:

Carefully remove the receiver from its packing material. Examine it for any signs of damage which may have occurred in transit. If any signs of such damage should appear, file a claim immediately with the carrier, also notifying DAVCO ELECTRONICS, INC., of the nature of the damage. Retain all shipping labels and packing material.

You will note packages of small connectors and other parts. These parts can be checked against the parts list and any shortages noted. Additional connectors may be purchased from any radio parts house.

ELECTRICAL CONNECTIONS:

Connections for the external power source (battery or power supply) and speaker are made by use of the 8-connector "Jones Plug" on the rear of the unit. Red, Black, and paired white wire is provided for the first connection; choose your own colors and lengths for custom installation.

Jones Plug wiring:
pin 1 : no connection
pin 2 : no connection
pin 3 : jumper to pin 4
pin 4 : jumper to pin 3

pin 5: one side of speaker
pin 6 : Negative supply in series with STBY switch for muting purposes; oscillators remain functioning when off or on. If no external muting is employed, jumper to pin 8 .
pin 7 : Positive (+) power supply connection
pin 8 : Negative (-) power supply connection

The other side of the speaker goes to pin 8 or pin 6 depending upon the muting system used; use the one which provides least pop when going to the STBY mode. Note that this means that one side of the speaker is connected directly to the Negative power supply connection; see speaker and power supply notes in this booklet for further information.

POWER SUPPLY

The DR-30 is designed to operate from any well-filtered DC source of at least 12 volts and not more than 16 volts. Lower voltages cuase decreased audio output, while higher ones can can cause immediate or eventual damage to components. Current requirements are a maximum of 300 milliamperes, or less than half that when the panel lights are switched off.

Voltages to critical circuits in the receiver are internally regulated by zener diodes, but a correct supply should have good filtering and either regulation or an adequate reserve output. If in doubt about the latter, measure the voltage under a full load of high audio output and the panel lights "on". Any supply which meets these requirements will be acceptable, including some "battery eliminateors" and chargers, service bench supplies, or a very simple transformer type home-built supply.

Batteries are quite appropriate for portable use or most fixed-station applications. Two six-volt lantern cells plus a 1½ volt flashlight battery in series will provide many hours of operation, especially if panel lights are not used; the 1½ volt battery provides for battery aging and is highly reccommended. At a satisfactory audio output level the average current drain for the entire unit less lights is about 90 milliamperes, or about one-fourth that of a flashlight-type bulb. A typical battery life for the 13½ volt arrangement described will be 3 months at 2 hours per day.

MOBILE POWER SUPPLIES

The normal mobile installation is in an automobile with a "12 volt" system. To utilize this system, detirmine the polarity of the chassis from the grounding cable and the battery markings. Set the polarity switch on the rear panel to match the vehicle chassis polarity. The low power consumption of the receiver allows the use of almost any wiring, including accessory connections for cigarette lighters, etc. The "cold" side of the supply can be to a chassis point, but it is reccommended that an insulated wire of size 20 or larger be run directly to the battery terminal.

The DR-30 receiver may readily be used in vehicles with 6-volt systems. The simplest way to do this is to add a lantern-type battery in series with the car's own system in the line to the receiver. For increased life, a cool spot should be bhosen for the battery. In any vehicle where ignition noise is a problem, it is wise to see if battery operation, rather than use of the car's system, reduces or eliminates the problem.

Some power supplies or batteries have sufficient internal impedance that a filter is desirable; two 100 MFD capacitors are provided for connection across such a supply if needed. Be sure to observe the marked polarity of the capacitors if used.

SPEAKER

The DR-30 audio system is at its best with a 16-ohm loudspeaker load, but an 8-ohm speaker can be used with only a slight loss in audio output capability. A 3.2 ohm speaker is not recommended.

As previously noted, one side of the speaker connection is also the negative power supply connection. If the unit is used in a situation where the polarity switch of the receiver is in the negative position, the lead can go to the chassis or to the chassis of a vehicle in which the unit is used. In all other cases, two speaker leads will be required, and the speaker should not be grounded to the chassis.

Those using an existing car radio speaker should provide a double-throw switch to change from one radio to the other. With a positive-ground car, as mentioned above, it will be necessary to unground the speaker and run a separate lead to each terminal and to use a double-pole changeover swithc.

The loudspeaker chosen for communications reception might well not have high-fidelity characteristics. However, those who listen frequently to foreign-broadcast stations may wish to have more than minimal quality; you should not hesitate to use a quality unit. Most subminiature speakers, such as those sold for portable radio replacement, have neither the quality or power-handling capacity which is desired. The bandwidth limiting devices in the receiver are sufficient for good communications quality even in a wide-response speaker is used.

No damage to the receiver will result if it is operated without a speaker.

ANTENNA

The DR-30 uses an input circuit for an unbalanced 40 to 70 ohm antenna. Almost any piece of wire will give some reception of strong signals, but for optimum performance and antenna designed for the frequencies desired is best. Various amateur publications can provide a vast amount of infommation for those seeking it.

The antenna inputs require "phono plugs". The shielded types are most desirable and are usually available from audio suppliers if no radio parts store is close by.

ANTENNA 1 input is for all frequencies 3.5 - 30 Mc. Antenna 6 input is for 50 Mc reception, and feeds into a tuned circuit peaked at 50.250 Mc. A trimmer is provided next to the connection for adjusting this circuit and it is recommended that it be peaked with the particular antenna which is used.

GROUND

A terminal lug (6-32) is provided on the rear of the receiver for grounding purposes. Any amateur station's equipment should be safely grounded with heavy copper braid ot wire to a cold water pipe or an earth ground.

Since the DR-30 is aapable of operation without connection to household wiring, it is important to note that for optimum performance, the receiver should be grounded in the best method possible even while operating from batteries. Although the great sensitivity of the RF amplifier stages can produce excellent reception under some conditions when not grounded, the full potential of the unit for weak signal reception as well as various image and IF rejection characteristics is realized only when a satisfactory antenna and ground system are employed.

OPERATION-----THE FIRST TIME

Double check the polarity and chosen color coding of the power wiring; solder the wires to the Jones Plug terminals. Make the battery-p.s. connections and the loudspeaker connections as indicated.

Insert the Jones plug in the receptacle on the rear of the receiver. Plug some type of wire or antenna (use a phono connector) in the ANT 1 jack. If a piece of wire is used temporarily, make an effort to drape it out a window if in a steel frame building.

Turn the unit on with the panel switch, on the AF Gain control. Move the panel light switch to the LT. position; see if the lights are working. A polarity diode at the power supply input connection prevents operation and damage from incorrect connection.

PULL the RF Gain control "out"; this is the STBY switch and the receiver does not operate when pushed "in".

Be sure the Notch Tune, RF Gain, ANL Level controls are fully counterclockwise. Choose your band of operation; turn the preselector until the pointer matches the band in use, and , with the audio gain turned up, receiver or antenna noise at that frequency is heard and peaked.

Most controls are self-explanatory, so tune in various types of stations and try the controls which are applicable. After some familiarity is acheived, read the remaining portion of this for more specific details on exact control fundtions.

TYPICAL OPERATION

Single Sideband reception

AGC Hold : in hold position--to the right
RF Gain: fully counterclockwise; pulled "out"
Preselector: peaked on desired frequency, corresponding to bandswitch frequency
Audio Gain: advanced until background noise is audible
Selectivity: 2.1 kc.
Function Switch: usually LSB for 3.5 and 7 Mc bands, USB for others
Notch tune: fully counterclockwise
ANL level: fully counterclockwise
CAL-Lt. : center, or LT.
Tuning: Operating in the SSB portion of any amateur band, very slowly adjust the tuning control until a voice signal sounds natural. If no tuning adjustment allows this, try changing the function switch to the other SB position

If a heterodyne appears, null it with the notch control. This tuning is critical due to the sharpness of the notch, and retuning of the main tuning control necessitates retuning the notch. In using the notch in AM recpetion, note that elimination of either the desired or the undesired carrier stops the whistle; make sure you null the undesired carrier.

If noise is present, advance the ANL LEVEL control as suggested in the Control Function section.

CW reception

Controls as in SSB reception, but selectivity control may be in the 2.1 or .5 kc position. When the narrow filter is used, note that one particular audio tone stands out when tuning; this corresponds to the center of the filter bandpass and is the point where the S-meter will read highest. This is a very sharp filter and is most effective in digging a weak station from in the midst of a number of stronger ones or listening in the presense of considerable noise. The Notch and ANL should be used where required.

AM reception

Function switch: AM position
Selectivity: 5 kc if conditions permit; otherwise treat as if signal were SSB

The notch is extremely useful in receiving AM under normal crowded conditions. The noise limiter can cause distortion, and is of limited effectiveness on AM. This can be improved by reducing the RF input (turning the RF Gain clockwise) until the AGC is not actuated (little or no S-meter indication).

RECEPTION HINTS

WWV time and freuqncy standard transmissions can be heard at 10.0 Mc. Reception of this station is useful for zeroing the crystal calibrator and other purposes.

On several of the bands, the preselector is capable of covering not only the desired signal range, but also the image frequency range which is normally rejected. By tuning the preselector to the image frequency rather than the indicated band region , these segments can be heard. Most of these image ranges are not of particular interest for general listening. An important exception occurs in the case of the 9.5-10.050 Mc range. The image for this range is 14.860 -15.410 Mc. Tuning is, of course, reversed, but this range includes the popular "19 meter" short wave broadcast band and the 15 Mc WWV frequency.

To calculate the signal frequency from the indicated frequency, look at the crystal chart. Subtract the indicated freq. from the xtal freq.; this is the "IF frequency". Take this figure and add it to the xtal freq. The result is the image frequency.
Xtal freq - ind. freq = IF
Xtal freq + IF = received image freq.
or, to detirmine the calibrated freq for a desired image freq
desired image freq - xtal freq = IF
Xtal freq - IF = ~~image~~ indicated freq.
Example: to what freq must Receiver be tuned to cover 15 MC WWV?
15 Mc - 12.455 Mc = 2.455
12.455 - 2.455 = 9.910 . The receiver should be tuned to
9.910 Mc, but with the preselector tuned beyond the calibration for the 14 Mc (20 meter) range.

CONTROL FUNCTIONS

ON-OFF : retate the AF Gain control to the right to turn the unit on.

AF Gain: varies the audio output; increased volumex clockwise.

RF Gain: actually an attentuator in series with the antenna, permitting adjustment of the amplitude of the signal reaching the RF stage; this is therefore quite useful in preventing overload from nearby stations. The maximum receiver sensitivity is obtained when the control is fully COUNTERCLOCKWISE; turning it to the right increases the attenuation, not the sensitivity.

STBY : When the RF Gain control is pushed "in", voltages to circuits other than the oscillators is turned off; the oscillators remain functioning for possible use with other equipment. This control effectively mutes the receiver when desired, and terminals on the Jones Plug permit operation of this function by a relay or external switch.

Function switch:
a three-position rotary switch with the following action:
AM----the AM detector is in use
USB---the product detector is in use, and the USB crystal in the BFO is connected
LSB---product detector, LSB crystal connected, and the VFO frequency is shifted so thatthe dial calibration remains essentially constant

Selectivity:
The three choices of IF selectivity are provided for optimum interference rejection and fidelity. Approximate bandwidths are indicated; see technical description for details

Notch Tune :
The notch tune control adjusts the frequency of the rejection notch in the IF passband. This notch is capable of rejecting any single interfering hererodyne or carrier which may be causing interference. The adjustment is critical. When not in use, the control should be turned to the extreme counterclockwise position.

AGC HOLD:this toggle switch allows the operator to select the decay time of the Automatic Gain Control system. The left position, or fast decay, is used normally for AM reception and bandscanning. The right "hold" position is effective in eliminating thumps and clicks in SSB and CW reception of strong signals, and the decay time is such that the AGC does not bring up the background noise between syllables of speach.

ANL LEVEL: adjusts the threshold of the noise blanking action. The ANL is most effective on ignition-type noise, and only on SSB and CW. To place in operation, advance the control clockwise until the noise dissappears, but not so far as to reduce the desired signal..

Control Functions (cont)

A-B Switch: As provided, this switch functions as a "tone control" with some reduction of the high audio frequencies in the A position. This can be useful, depending upon the characteristics of the signal, the noise, and the loudspeaker.

The A-B switch is a spdt toggle unit with its center pole connected to the positive side of the receiver power. A lead is brought to the connection plug so the A or B position can control some accessory equipment, such as an antenna switching relay, a phone patch, or anything where the maximum 5 amps and 115 volts rating of the switch is not exceeded. The tone control function can be disabled by clipping or unsoldering the white wire to the switch.

CAL-LTS switch:

This DPDT switch has a center off position. In the CAL position, the internal 100 kc crystal calibrator is in operation. In order to allow the calibrator signal to reach the RF stage, and to attenuate the signals from the antenna to avoid confusion, the RF Gain control should be rotated to the right as far as necessary. The calibrator should be turned off when not in use to avoid undesired responses.

In the LT. position, the panel lights are turned on. When operating from portable batteries, power consumption is less than half with the lights turned off.

PRESELECTOR: used to tune the RF input and output circuits to the desired frequency. In normal use, tune the preselector until the pointer is toward the MC marking which corresponds to the band in use. The final fine adjustment is then made by listening to the antenna noise or observing the S-meter on a received signal. Note that it is possible to tune the preselector to an image frequency causing incorrect reception; always start in the range of the marked frequencies. It is also apparentin use that on the lower bands, particularly, the preselector should be re-peaked when making a wide frequency excursion within the band.

SCREWDRIVER ADJUSTMENTS:

(a) the dial may be corrected as much as 20 kc. by the small trimmer located near the function switch. A small screwdriver should be used.

(b) Notch depth control is in the lower portion of the back panel. It should rarely need adjustment after factory setting

(c) Calibrator zero trimmer can be adjusted through the small hole in the right side of the back panel. This is best done when WWV can be received strongly enough for a clear zero-beat indication. Only rarely will the calibrator be significantly off frequency.

TECHNICAL DESCRIPTION

The DR-30 receiver is a double-conversion superheterodyne unit with frequency converage of 12 one-half megacycle bands in the range of 3.5 to 52 megacycles.

Signals from the antenna input ANT 1 pass through the RF GAIN attenuator and thence to a low-impedance tap on the antenna input coil. This high-Q toroidal inductor is tuned by the preselector capacitor to a frequency range of approximately 6.5 MC to 17 Mc. For frequencies lower than this range, capacitors are connected across the toroid by the bandswitch; for higher frequencies, inductors are connected. The RF amplifier transistor is a premium grade UHF-type which provides an extremely low noise figure at the frequencies of use; it is operated in the common base configuration . The output from this amplifier is via a tuned circuit similar to the input circuit.

The high-frequency conversion oscillator is operated in the fundamental mode from crystals up to 18 Mc, and as an overtone oscillator above that, by selecting the collector load as a resistor for fund. operation and a tuned circuit for overtone. A different tunable collector circuit is provided for each overtone crystal range.

Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. The crystal is chosen higher than the received signal, and the output frequency range is 2.405 to 2.955 Mc. The output of the first mixer is to a high-Q tuned circuit which is tuned and tracked to the VFO by one section of the main tuning capacitor. A first IF amplifier follows this circuit, and a high-pass filter for additional image rejection is used in the output of this amplifier.

The VFO, or tuning oscillator, covers a range of 1.950 - 2.500 Mc., and utilizes a high-Q toroidal inductive element. Note that because of the choice of xtal frequencies, when the VFO frequency goes "up", the received frequency goes "down". An amplifier-buffer stage for the VFO provides isolation for the tuning oscillator, and the voltage supply to the VFO is regulated by s separate zener regulator.

The second mixer combines the VFO and IF and has an output of 455 kc. Tunable IF transformers precede and follow a 455 kc amplifier, and several fixed-tuned ceramic 455 kc filter-resonators provide additional selectivity.

The output of the 455 kc amplifier is fed to the noise limiter amplifier which increases theamplitude and rise time of the noise pulses which reach it. Sine the effective selectivity is still rather broad at this point, no significant noise pulse lengthening has taken place here, as ould be the case if the noise were not eliminated until after the highly selective IF filters. A noise amplifier-detector further processes the noise pulse, providing a pulse output which is used to turn"off" the switching diode gate for the duration of the noise pulse, effectively muting the receiver during this time. Noise pulses are thereby prevented from actuating the AGC circuits and thereby reducing the receiver sensitivity. The ANL level control adjusts the bias on the gating diode and therefore the noise limiter threshold.

TECHNICAL DESCRIPTION (cont)

Following the pulse gate several diodes make up a switching network which changes the signal path to the various selectivity paths; DC biasing is applied to the diodes to turn them on or off as required. The broad selectivity incorporates three ceramic 455 kc filter resonators plus three IF transformers; the 2.1 kc selectivity path uses the Collins mechanical filter, while the narrowest path for CW reception uses a 455 kc xtal filter in series with the mechanical filter. Other switching diodes are used in the circuit for connectin the mechanical filter to the connector jacks on the rear of the receiver for use with the companion DT-20 transmitter or other units.

One additional 455 kc IF amplifier follows the filters, and preceeds the rejection notch circuit. A back-panel screwdriver notch depth control is factory pre-set for best results.

Following the notch circuit is the AGC isolation amplifier, which prevents AGC detector from causing distortion in the other detectors. The AGC detector itself operates in a bootstrap-type of arrangement to provide the fast-attack adjustable-hold characteristics which are desired. The output of the AGC amplifier varies with signal strength from full B- to around 1volt negative; this control voltage is fed via a voltage divider to the RF stage, the 1st IF amplifier, the 2cd mixer, and the 1st 455 kc amplifier, and is also sent to the S-meter. Hold action for the AGC is adjusted by changing the RC constant of the hold circuit.

For CW and SSB reception, a crystal BFO-carrier generator signal chesen in relation to the passband of the mechanical filter is injected into the product detector. A circuit in the VFO shifts that frequency to compensate for the USB and LSB signal-frequency shift. For AM reception, a low-distortion AM detector is employed.

The function switch, inaddition to shifting the VFO and the BFO crystals, also selects the output of one or the other detectors and feeds them to the audio preamplifier, and thence to the AF Gain control. An additional audio preamp and driver stage then provide the signal for the push-pull transformerless audio output circuit which is designed for low distortion and good communications quality.

MECHANICAL DETAILS

The basis of the DR-30 construction is an extremely rigid solid aluminum extrusion. This extrusion is designed to support the plug-in printed circuit modules, and slots are milled in the massive part for attachment of connectors, panels, and other parts. All parts which require physical stability are attached to this base, and the capacitor drive unit is of similar construction, with a milled aluminum shape holding ball bearings for the drive shafts. All components except controls are mounted on printed circuit boards; G-10 glass epoxy board is used for maximum strength. The boards may be removed for servicing as a subassembly. Cadmium-plated steel panels are used to support the controls and other parts. Throughout the receiver, components and parts used are operating well below their rated or designed maximum capabilities, thus assuring extreme reliability.

TRANSISTOR COMPLEMENT

Q1	RF AMPLIFIER
Q2	First mixer
Q3	First (high frequency) IF amplifier
Q4	Second mixer
Q5	First 455 kc. IF amplifier
Q6	Xtal high-frequency conversion oscillator
Q7	Tuning oscillator (VFO)
Q8	VFO amplifier-buffer
Q9	First audio preamplifier
Q10	100 KC calibrator
Q11	100 KC calibrator amplifier-harmonic generator
Q12	Mechanical filter amplifier
Q13	Second 455 Kc IF amplifier
Q14	AGC amplifier-buffer
Q15	AGC detector
Q16	AM detector
Q17	Product detector
Q18	Xtal BFO-carrier generator
Q19	Second Audio preamplifier
Q20	Audio driver
Q21	Audio output
Q22	Audio output
Q23	100 Kc calibrator oscillator
Q24	ANL amplifier
Q25	ANL detector-pulse generator

All diodes except where noted are general-purpose germanium types
1N698 is low forward-resistance type
zener diodes are 6.8 volts 10 % tolerance types.

Crystal frequencies

10 Mc. band:	12.455 Mc.	10A meters :	30.955 Mc.
80 meters :	6.455 Mc.	10B meters :	31.455 Mc.
40 meters :	9.955 Mc.	10C meters :	31.955 Mc.
20 meters :	16.955 Mc.	10D meters :	32.455 Mc.
15 meters :	23.955 Mc.	6 meters :	52.955 Mc.

Extra band segments:

The A and B positions on the bandswitch of the DR-30 can be used for other 550 Kc. band segments when the proper crystal and RF stage components are installed. As supplied, the B position is wired so that a fundamental type crystal can be wired directly to the printed circuit board, and with no further changes, signals in the 6.5-17 Mc range can be received. The A position is for use with harmonic type crystals, which require a tuned collector load appropriate for the crystal. In the case of a crystal close to the frequency of an existing overtone type, the collector load of the existing crystal can be used. In all other cases, contact the factory for specific instructions, giving frequency of band desired and type of crystal available or needed. Modifications for coverage of almost any frequency-range combination can simply and quickly be done, including replacement of present bands with alternate ones.

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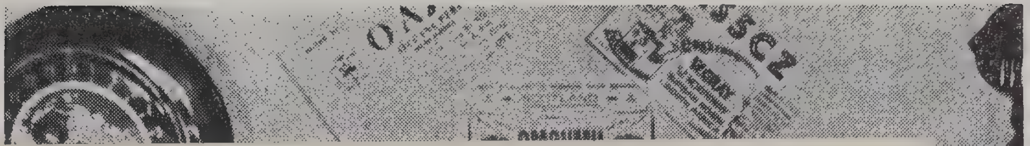
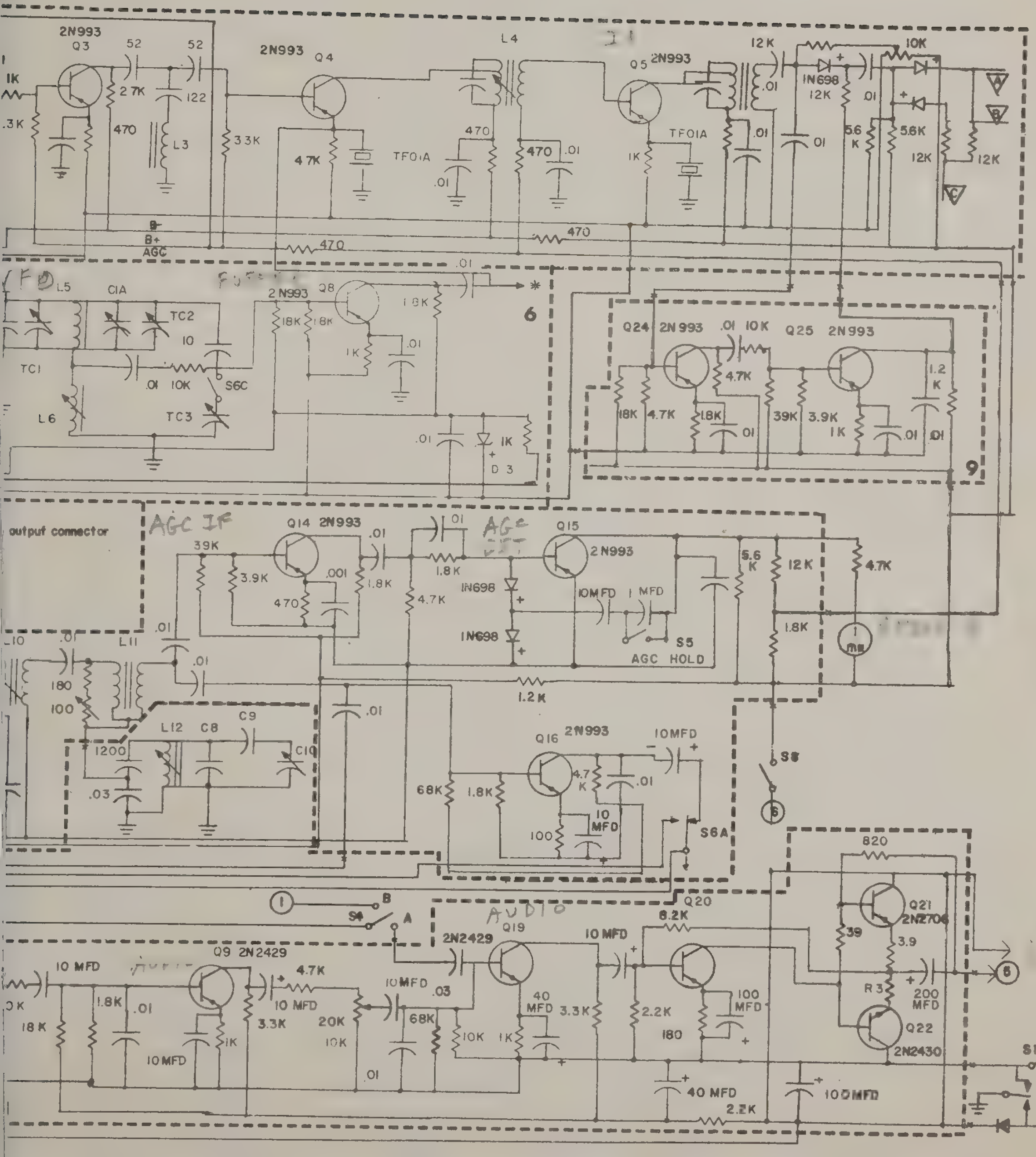


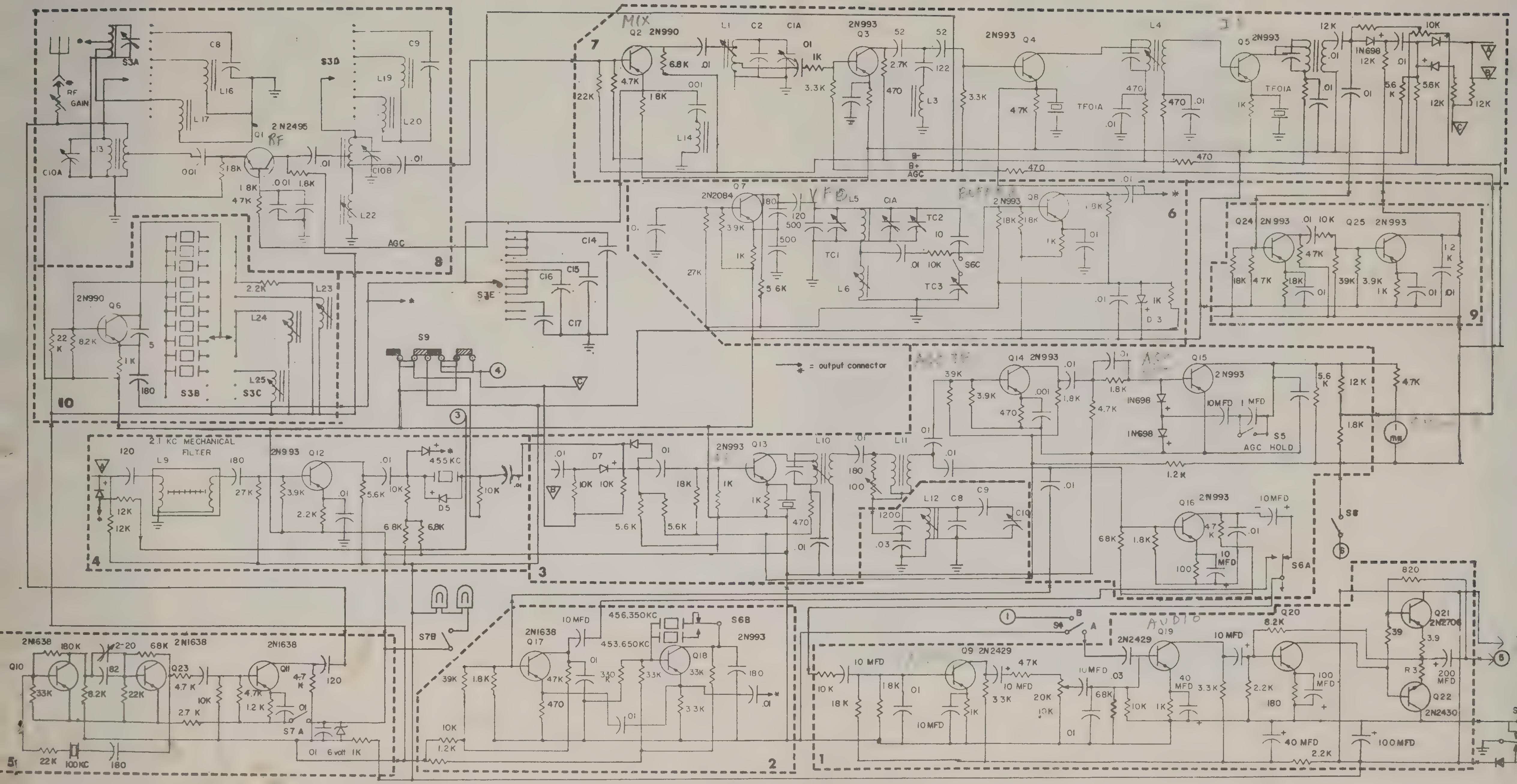
DR 30

CEIVER

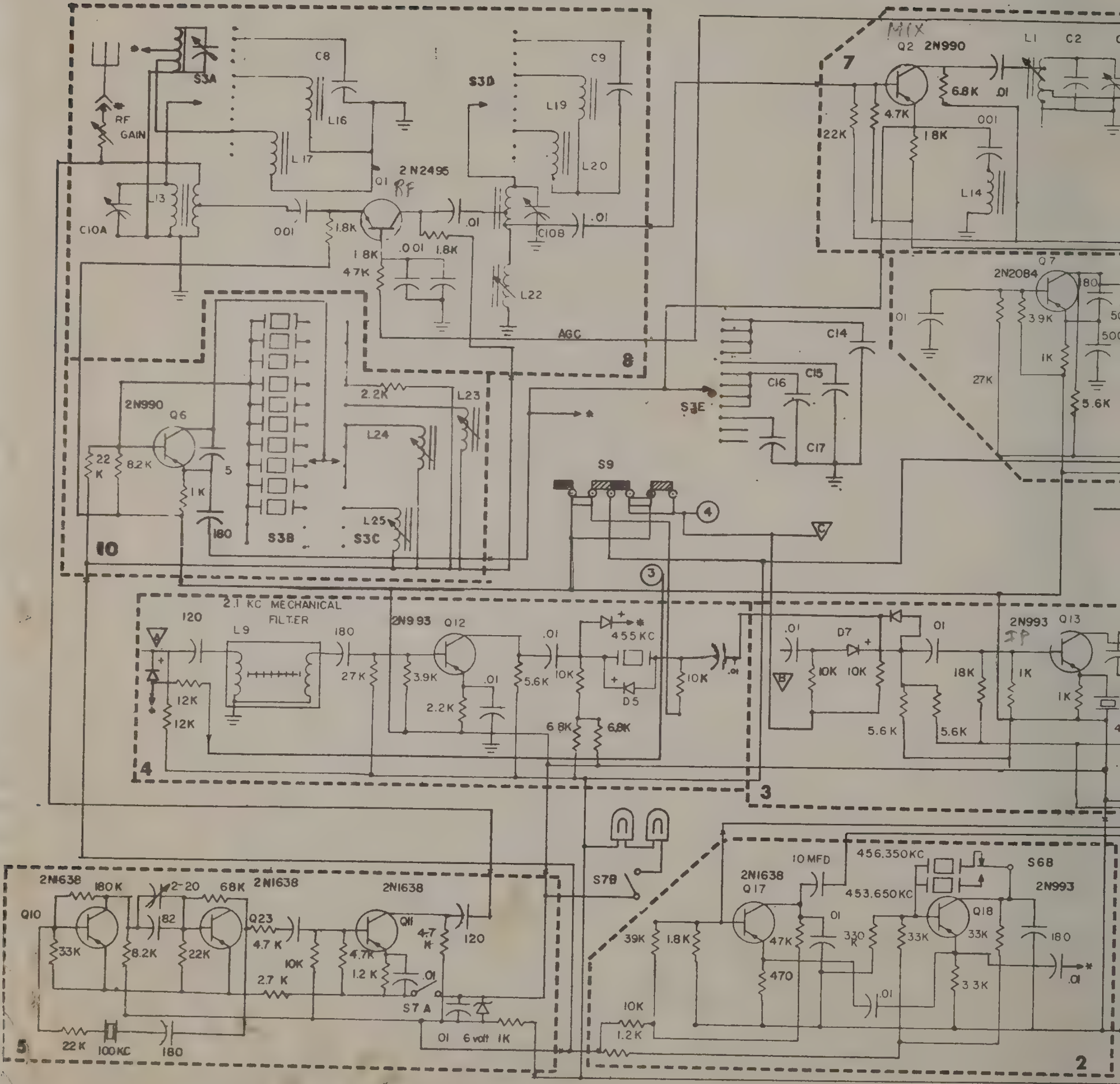


DR 30

DAVCO ELECTRONICS, INC. TALLAHASSEE, FLORIDA MODEL DR-30 COMMUNICATIONS RECEIVER

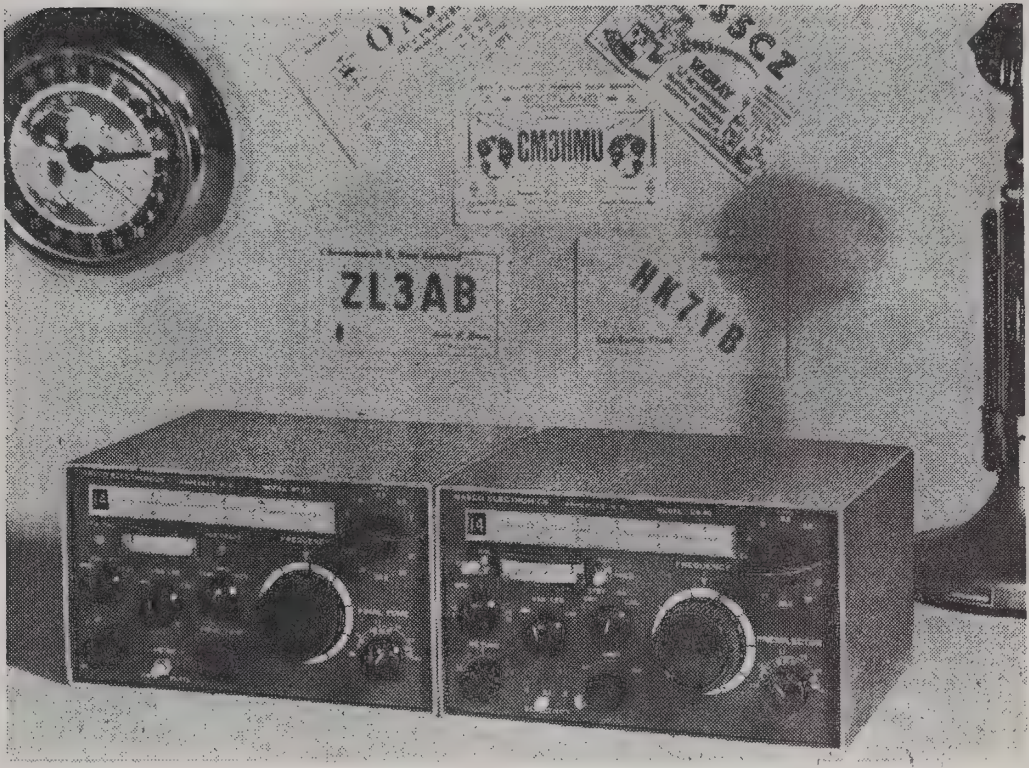


DAVCO ELECTRONICS, INC. TALLAHASSEE, FLORIDA MODEL DR-30 COMMUNICATIONS



REPRINTED FROM 73 MAGAZINE - APRIL 1963

DT20 DR30



DAVCO

113 Norwood Ave., Asheville, N. C.

$571±

Two thousand designers—that would be quite a staff for any company. But that's how many hams we talked with before deciding what our new line of equipment should offer. They said they wanted transceiver convenience, but separate VFO's for chasing DX; we gave them both. They needed all the bands, not only for ragchewing on the high bands but because the sunspots won't be uncooperative forever; we put in *full* coverage of 80 through 10, even the foreign segments, and then some. Is 6-meter coverage too much to expect? We don't think so. Think what that means! They asked for AM & CW, along with the high-performance SSB, so we provided three positions of receiver selectivity, including a Collins mechanical filter and a CW crystal filter, and worked out good keying characteristics on the transmitter. Of course they insisted upon good stability; we had to work a long time to provide it at the temperature extremes they encounter. Almost everybody would add a crystal calibrator, so we did it for them and even provided WWV coverage. They asked for a transmitter power level which wouldn't require overhauling of the electrical system of the family bus, yet they wanted enough for a really emphatic signal mobiling and enough to drive a linear back home. Oh, they asked for lots of things; we put in independent broadcast coverage, a built-in VOX, selectable AGC time constants, extra band positions for MARS, etc., a crystal controlled carrier generator and BFO for USB and LSB, a tuning ratio that gives 10 kc to a turn, and everything else that you expect. Then we made plug-in subassemblies of all this, held them together with a really rugged (and heavy) chassis, and wrapped it all in fiberglass cabinets that don't shrink from field-day duty.

We had to borrow freely of the components and techniques of the computer-and-missile crowd in order to do all of this, and we don't quite know how to characterize the results. In pure performance and versatility, the DAVCO DR-30 and DT-20 must be ranked with the best fixed-station rigs, but the small size and ease of operation make them quite logical mobile or portable rig choices. And what an outfit for DX-peditions (besides the performance, hand luggage goes through customs a lot easier!)

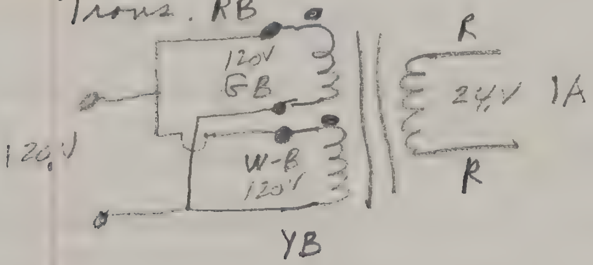
Our 2000 friends gave us quite an assignment, and it took us darned near three years to fill it. We sincerely hope that the results are a significant contribution to the application of space-age technology to the amateur field.

Power Supply Davco DR-30

Chassis BUD CU-3008

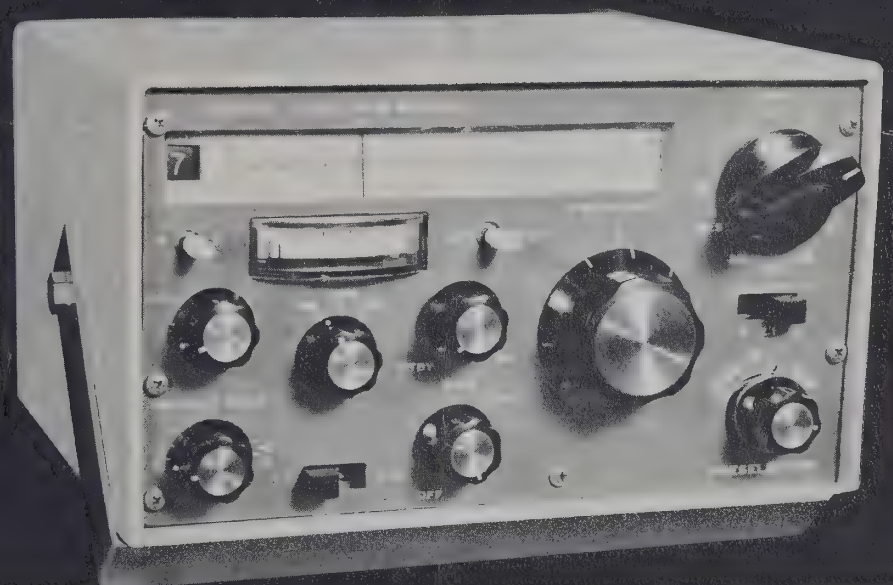
Spkr 40Ω 3½ or 4" square

Trans.



DR 30

DAVCO ELECTRONICS, INC.

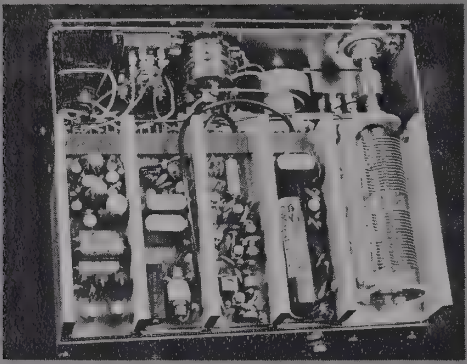


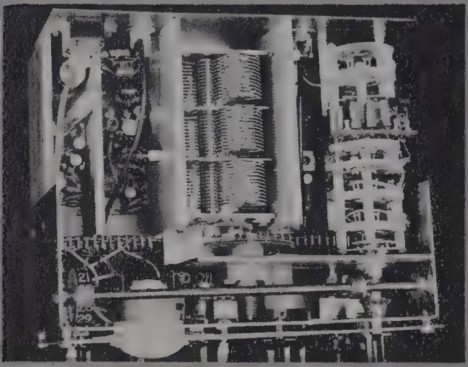
a high performance communications receiver for amateur band applications. (Usable as part of an SSB transceiver pair.)

One of the outstanding new DAVCO products for amateur users, the DR-30 is equipped to provide maximum communications effectiveness under the most rigorous conditions. Utilizing 35 solid-state components, crystal stability, a Collins mechanical filter and including full band coverage and extra QRM-cutting features, the DAVCO DR-30 is a complete and compact package.

Versatility . . .

Performance . . .





Never before such a package of features for every operating requirement!
The only unit to combine the small size, rugged construction and tuning ease of a mobile unit with the extra performance and capabilities demanded in the finest base station receiver.

THE DAVCO DR-30 receiver is engineered to meet the needs of the most demanding amateurs, no matter the preference in bands or modes of operation. A proud investment in improved communications and an excellent choice for mobile, fixed, or portable operation.

FEATURES

- Complete ham-band coverage 80-10 meters and portion of 6 meters; provision for other segments for CB, SWL, MARS, etc.
- Standard-equipment 9.50-10.05 Mc. band provides WWV and 31 meter SWL band
- Three position selectivity for optimum fidelity and QRM rejection
- Crystal-controlled BFO; separate AM and Product detectors; AF and RF gain controls
- Full AGC with selectable decay time, S-Meter; illuminated dial
- Flywheel tuning drive with high-ratio split gears, full calibration on all bands
- Tunable rejection notch filter; extremely effective noise limiter
- Transmitter type VFO, crystal controlled first oscillator; built in crystal calibrator
- Low power consumption, permitting battery operation when desired
- Full transistorization, diode selectivity switching, plug-in module construction, highest quality components
- Rugged, stable extruded aluminum chassis, textured grey metal case; connections for use with companion transmitter when desired

DR-30 RECEIVER $315.00

The availability of new components and circuit techniques, a design philosophy both imaginative and conservative, and a continued awareness of the wishes and needs of the amateur fraternity have allowed DAVCO to produce equipment such as the DR-30. Equipment engineered to promote full capabilities of performance, great pleasure and confidence in operation, and full flexibility for every application.

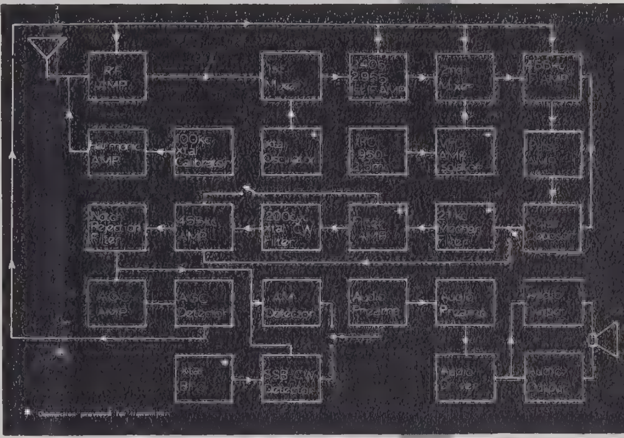
Technical DATA—Model DR-30 communications receiver
Double conversion superhet, fully transistorized; crystal controlled first oscillator, ten crystals supplied for frequencies below:

3.5— 4.050 Mc
7.0— 7.550 Mc
9.5—10.050 Mc
14.0—14.550 Mc
21.0—21.550 Mc
28.0—28.550 Mc
28.5—29.050 Mc
29.0—29.550 Mc
29.5—30.050 Mc
50.0—50.550 Mc

plus two extra switch positions for other 550 kc segments as desired

Sensitivity: better than 1 uv for 10 db s/n; 1 uv for .3 watts audio

Selectivity: SSB: 2.1 kc Collins mechanical filter
AM: nominal 5 kc broad IF
CW: 200 cycle xtal filter in series with mechanical filter for improved skirt rejection



Stability: neglible warm-up change; less than 100 cps change per hour; less than 25 cps for 20% power supply variation.

Audio: .6 watt at 10% disortion; max 1 watt

Tuning: spring-loaded split gear drive unit with 168:1 ratio gives 10 kc. per turn of tuning knob; permits natural sounding SSB even while mobiling

Calibration: internal 100 kc xtal calibrator supplied; slide-rule dial has 10 kc markings, hairline pointer; tuning knob has 1 kc marks on perimeter; internal frequency shift for sideband compensation

Spurious responses: images and IF down at least 50 db below 22 Mc., at least 35 db 22-52 Mc. Internal spurious less than equivalent 1 uv signal at input

Frequency readout: significant figure (Mc.) appears in indicator window, is color coded as to whether .000-.550 Mc or .500-1.050 section is in use. Can provide direct calibration with accessory crystals

Detectors: linear AM detector; separate product detector for SSB and CW; crystal controlled BFO-carrier generator for USB and LSB.

AGC: full action on all modes of operation; has fast-attack characteristic; panel switch selects fast release (.015 seconds) for AM and breakin or slow release (1 sec.) for SSB. Audio varies 8 db for 80 db change in RF input AGC action is delayed to 5 uvolts.

Noise limiter: true blanking type action occurs before selectivity lengthens pulses; has separate ANL amplifier and detector, diode noise gate. Front panel control.

RF stage: low-noise premium transistor; input and output tuned circuits employ high-Q toroidal inductors

Rejection filter: tunable notch can provide more than 50 db rejection of undesired carrier

Intermediate frequencies: 1st IF: 2.405—2.955 Mc (variable, tracked) 2cd IF: 455 kc.

Semiconductor complement: 25 transistors, 10 diodes

Size: 4" H, 7⅛" W, 6" D. Weight 7 pounds

Power requirements: 12 volts DC 300 ma maximum, 150 ma. maximum without panel lights (switch provided)

DR-30 Receiver	$315.00

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[illegible] 78
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The DAVCO Model DT-20 Transmitter

200 watts PEP input on SSB

Same frequency coverage as DR-30 receiver; designed as a companion unit, with matching appearance and size (has metal cage 3½" deep at rear of cabinet for power stage). All low level stages transistorized; final is Amperex dual tetrode with excellent linearity. Mechanical filter sideband generation; carrier and unwanted SB at least 50 db down. Self contained VOX, PTT, speech compressor; AM and CW provision. Has an identical VFO to the DR-30 and can be separately controlled or transceive operated with the DR-30 when desired; allows complete flexibility in operating DX and is one of the few "SSB transceivers" that can transmit and receive CW on the same frequency, a must for the serious CW operator. Transceive operation simplifies mobile tuning when desired; provision for spot frequency crystal control. Same extremely high performance and engineering standards as the DR-30 receiver. Power supply operates from 6 or 12 v. DC and 110 or 220 v. AC (50-60 cycles).

Available in two models:

DT-20, for use with DAVCO DR-30 receiver. Uses first xtal conversion oscillator, carrier generator and mechanical filter from receiver via cables. Otherwise complete, including separate VFO, power supply, noise-cancelling microphone, and cables to DR-30 ---- $385.00

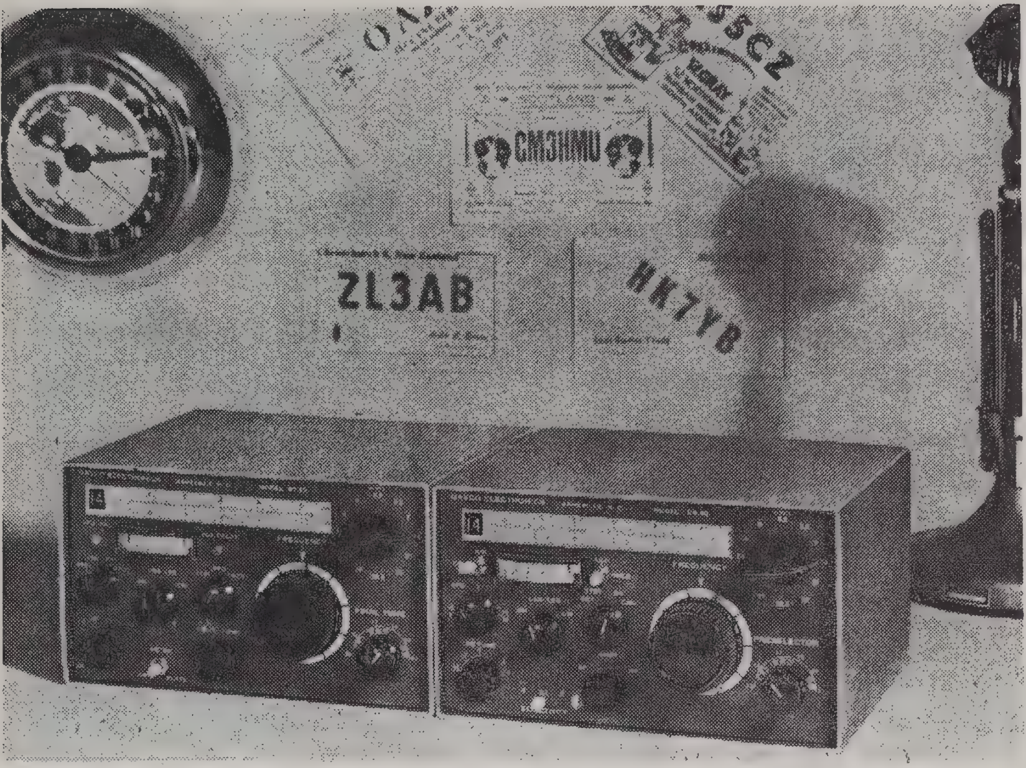
DT-20a, complete self contained transmitter including all crystals and filter; for use with other receivers. Including p.s. ------------ $595.00

A DR-30 and DT-20 combination offers the user a unique capability in all-band all-mode operation. Readily locked together physically for ease of transporting and installing. The pair of units can be considered as a transceiver in the usual sense, but the use of separate VFO's when desired as well as the inclusion of many other quality features offers the ultimate in operating convenience. An almost unlimited number of variations in tuning techniques allows maximum performance under any operating condition. Includes full band coverage, provision for CW and AM (even Novice CW), 6 meter coverage unique in SSB equipment and many other features. The total of 46 transistors, the high efficiency power output tube and a varsatile power supply make field day, DXpedition and portable operation quite practical and offer compatibility with any domestic or foreign auto system. The pair of units is ready for on-the-air operation with connection to antenna and power source.

DAVCO ELECTRONICS, INC.
2024 South Monroe St.
Post Office Box 2677 **Phone 224-4322 Area 305**
TALLAHASSEE, FLORIDA

Printed in U.S.A., 4/64

DT20 DR30



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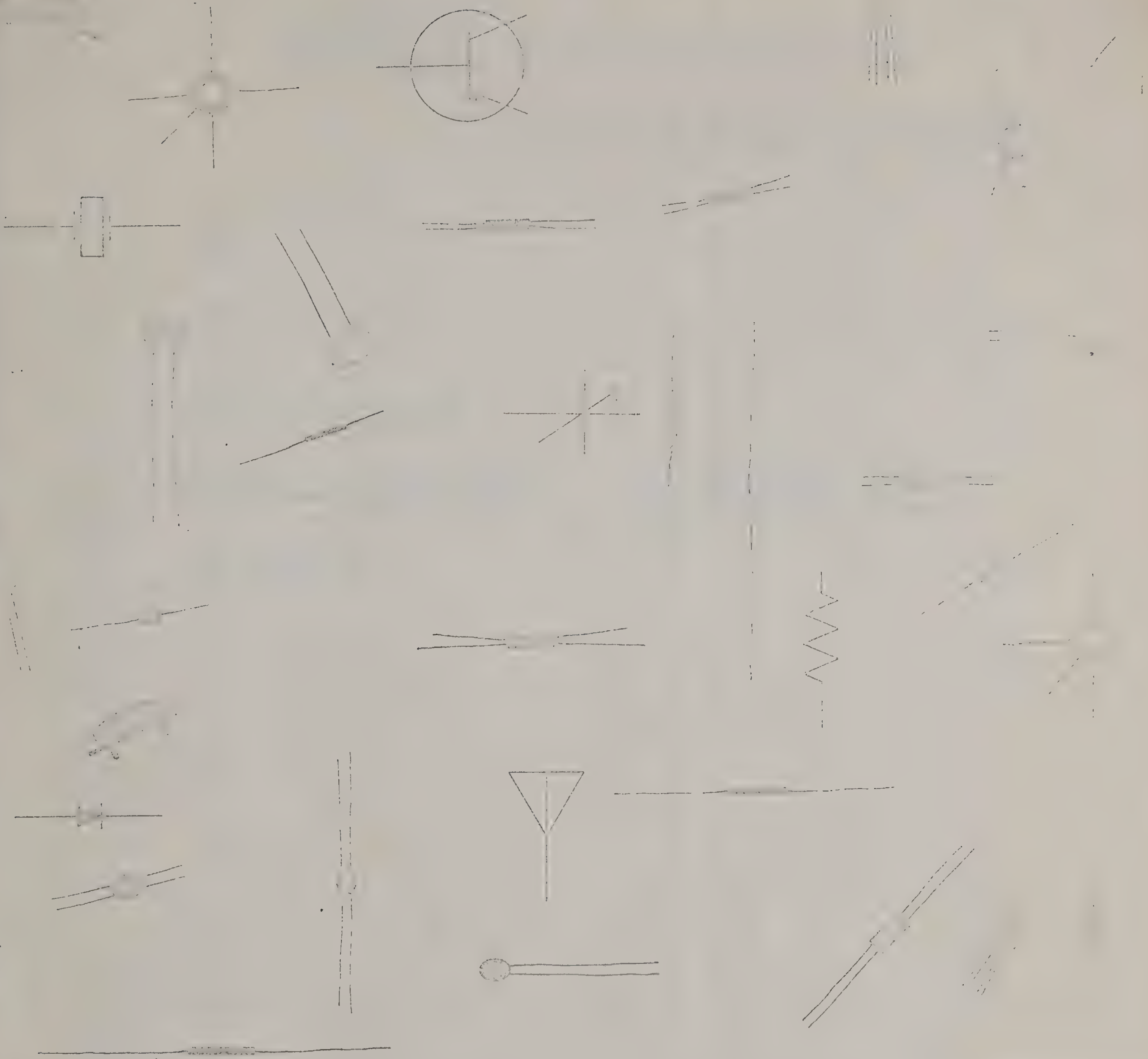
11/22/66



DAVCO

LECTRONICS INCORPORATED

TECHNICAL

DR-30 Communications Receiver

MANUAL

DAVCO

DAVCO ELECTRONICS, INC.

TALLAHASSEE, FLORIDA

OPERATION INSTALLATION SERVICE MANUAL

DR-30 Communications Receiver

CERTIFICATION

DAVCO ELECTRONICS, INC., certifies that this instrument was thoroughly tested and inspected prior to shipment from the factory. When shipment was made the instrument was free from any defect and met all published specifications.

Receiver Serial # 381 Model DR-30

Shipped to: ______

______

______ Date 9-15-66

Modifications	Coverage	Preselector
Band A		
Band B		
Other		

SSB-CW SENSITIVITY

All measurements made with Hewlett-Packard model 606B Signal Generator with calibration traceable to National Bureau of Standards and other equipment of industrial standards.

Signal level, in microvolts, required at antenna input for a signal-noise-to-noise ratio of 10 db; medium (2.1 kc mechanical filter) selectivity.

9.8 Mc	.22	28.8 Mc	.12
3.8 Mc	.18	29.3 Mc	.12
7.3 Mc	.14	29.8 Mc	.12
14.3 Mc	.15	50.3 Mc	.34
21.3 Mc	.15	A ______ Mc	
28.3 Mc	.12	B ______ Mc	

WARRANTY

All DAVCO products are warranted for six months from the date of shipment against defects in material or workmanship under normal use and service. Should any product prove defective during the warranty period, it will be repaired or replaced at no charge by DAVCO ELECTRONICS, INC.

This warranty shall apply only to the original purchaser unless the transfer of ownership is reported in writing to the Service Department of DAVCO ELECTRONICS, INC., prior to the appearance of the defect.

This warranty is not voided by work done in accordance with DAVCO recommended service procedures and with the recommended tools and instruments.

This warranty is totally voided by (a) use of corrosive flux or solder; (b) obvious evidence of physical abuse; or (c) failure to follow instructions regarding connections. DAVCO ELECTRONICS, INC., is not liable for consequential damages.

DR-30 COMMUNICATIONS RECEIVER

You have chosen one of the finest pieces of electronics equipment available. Like most radio receivers, the DR-30 can be operated with a minimum of experience, and, with the DR-30, better than average results will be achieved. The provision of a slow tuning rate, effective Automatic Gain Control, and excellent selectivity assure superb and simple performance under normal conditions.

Operation under marginal conditions of noise, band crowding, and weak signals offers a challenge to equipment and operator alike. The DR-30 is designed specifically to meet these conditions and you, the operator, can quickly learn your part of the team-work. You'll find an almost unlimited number of tuning techniques to meet any condition.

We suggest that you read very carefully the following sections on connecting your receiver and that you follow the instructions. When you have the receiver ready for operation, connect it to an antenna--or a piece of wire--and simply experiment. Try all the controls; see what they do. Listen to foreign broadcast stations, WWV and amateur transmissions on AM, CW, and SSB. After a few minutes of listening you'll be better prepared for a careful reading of the following detailed description of control functions and circuit operation. By a thorough understanding of each receiver feature, you'll be able to take advantage of the highly unusual capabilities of the equipment.

Your DR-30 receiver is a precision instrument incorporating the latest state-of-the-art design features. Your experience with it will allow it to earn your respect. Put it to all the tests: you'll continue to be happy with its versatility, its reliability, and its superlative performance.

DAVCO ELECTRONICS, INC.

BEFORE OPERATION

UNPACKING:

Carefully remove the receiver from its packing material. Examine it for any signs of damage which may have occurred in transit. If any signs of such damage should appear, file a claim immediately with the carrier, also notifying DAVCO ELECTRONICS, INC., of the nature of the damage. Retain all shipping labels and packing material.

You will note packages of small connectors and other parts. These parts can be checked against the parts list below and any shortages noted. Additional connectors may be purchased from any radio parts house.

PARTS LIST

2	100-125 MFD electrolytic capacitors
1	8-connection Jones Plug (2 in export shipments)
3	RCA Phono Plugs (6 in export shipments)
1	length 2-conductor speaker wire
1	short length bare wire
2	lengths colored hook-up wire
1	lockwasher (8-32)
1	wing nut (8-32)
1	instruction manual
	extra crystals, if any, are installed in set unless otherwise noted.

ELECTRICAL CONNECTIONS:

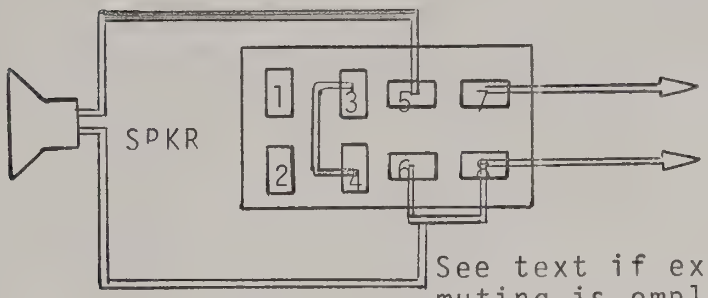
Connections for the external power source (battery or power supply) and speaker are made by use of the 8-connector "Jones Plug" on the rear of the unit. Red, black, and paired white wire is provided for the first connection; choose your own colors and lengths for custom installation.

Jones Plug wiring

pin 1: no connection
pin 2: no connection
pin 3: jumper to pin 4
pin 4: jumper to pin 3
pin 5: one side of speaker
pin 6: Negative supply in series with STBY switch for muting purposes; oscillators remain functioning when off or on. If no external muting is employed, jumper to pin 8.
pin 7: POSITIVE (+) power connection
pin 8: NEGATIVE (-) power supply connection

(CONTINUED)

The other side of the speaker goes to pin 8 or pin 6 depending upon the muting system used; use the one which provides least pop when going to the STBY mode. Note that this means that one side of the speaker is connected directly to the NEGATIVE power supply connection; see speaker and power supply notes in this booklet for further information.



See text if external muting is employed

Before proceeding any farther, continue reading about power supply requirements, speakers, antennas and other matters in the pages which follow.

DO NOT PLUG IN THE JONES PLUG YET!

POWER SUPPLY

General Requirements:

(a) nominal 12 volt D.C. output under 200 milliampere load.
(b) regulation, or reserve output beyond this
(c) good filtering if operating from A.C.
(d) isolation from A.C. line to eliminate shock hazard.

The DR-30 is designed to operate from any well-filtered DC source of at least 11.5 volts and not more than 16 volts. Lower voltages cause decreased audio output, while higher ones can cause immediate or eventual damage to components. Current requirements are a maximum of 300 milliamperes, or less than half that when the panel lights are switched off.

Voltages to critical circuits such as oscillators in the receiver are internally regulated by zener diodes, but a correct supply should have good filtering and either regulation or an adequate reserve output. If in doubt about the latter, measure the voltage under a full load of high audio output and the panel lights "on." The voltage should not drop below 11.5 volts on loud audio nor rise above 14 volts with little audio. Improper filtering can be recognized when a loud hum is heard from the speaker of the set. Any supply which meets these requirements will be acceptable, including some "battery eliminators" and chargers, service bench supplies, or a very simple transformer type home-built supply such as the one described in this booklet.

BATTERY OPERATION

Batteries are quite appropriate for portable use as well as fixed-station applications. Two six-volt lantern cells plus a 1 1/2 volt flashlight battery in series will provide many hours of operation, especially if panel lights are not used; the 1 1/2 volt battery provides for battery ageing and is highly recommended. At a satisfactory audio output level the average current drain for the entire unit less lights is about 90 milliamperes, or about one-fourth that of a flashlight-type bulb. A typical battery life for the 13 1/2 volt arrangement described will be 3 months at 2 hours per day. It is useful to note that excessive battery voltages can cause slightly optimistic S-meter readings: if using more than about 13 volts, make allowances for this effect.

A diode is provided internally to prevent damage to the receiver from connection to wrong power-supply polarity.

Don't plug the unit into the AC line as it is
Don't use an AC-type plug for any connections: you'll never know who'll be using the unit when you aren't around.
Don't reverse the negative and positive connections to the power supply.
Don't use a transformerless AC power-supply.
Don't operate the dial lights if battery life is important.
Do ground the unit securely when operating from an AC power supply and/or in association with other power-line operated equipment.

MOBILE POWER SUPPLIES

The normal mobile installation is in an automobile with a "12 volt" system. To utilize this system, determine the polarity of the auto chassis from the grounding cable and the battery markings. Set the polarity switch on the rear panel of the receiver to match the vehicle chassis polarity. The low power consumption of the receiver allows the use of almost any wiring which is available, including accessory connections for cigarette lighters, etc. The "cold" side of the supply can be to a chassis point, but it is recommended that an insulated wire of size 20 or larger be run directly to the battery terminal.

The DR-30 receiver may readily be used in vehicles with 6-volt systems. The simplest way to do this is to add a lantern-type battery in series with the car's own system in the line to the receiver, carefully observing all polarities. For increased life, a cool spot should be chosen for the battery.

In any vehicle where ignition noise is a problem, it is wise to see if battery operation, rather than use of the car's system, reduces or eliminates the problem.

(CONTINUED)

Note: Some power supplies or batteries have sufficient internal impedance that additional filtering is desirable; two 100 MFD capacitors are provided for connection across such a supply if needed. Be sure to observe the marked polarity of the capacitors.

SPEAKER

The DR-30 audio system is at its best with a 45-ohm loud-speaker load, but a 16 or 8-ohm speaker can be used with only a slight loss in audio output capability. A 3.2 ohm speaker is not recommended.

As previously noted, one side of the speaker connection is also the negative power supply connection. If the unit is used in a situation where the polarity switch of the receiver is in the negative position, the lead can go to the radio chassis or to the chassis of a vehicle in which the unit is used. In all other cases, two speaker leads will be required, and the speaker should not be grounded to the chassis.

Those using an existing car radio speaker should provide a double-throw switch to change from one radio to the other. With a positive-ground car, as mentioned above, it will be necessary to unground the speaker and run a separate lead to each terminal and to use a double-pole changeover switch.

A loudspeaker chosen for communications reception might well not be of the highest quality. However, intelligibility of signals is related to the fidelity of reproduction, and certain minimum standards must be observed. Most small speakers, such as those sold for portable radio replacement, have neither the quality nor the power-handling capacity which is desired. You should not hesitate to use a larger speaker with inherent good fidelity if this is possible. The band-width-limiting devices built into the receiver are more than adequate for shaping the speaker response. Low efficiency speakers such as the AR, KLH, or acoustic-suspension types are not recommended.

No damage to the receiver will result if it is operated without a speaker.

EARPHONE OPERATION

Many low impedance earphones can be used with the DR-30. The speaker leads may be run to a jack which matches your particular earphone. We suggest a magnetic type earphone which comes as close as possible to 300 ohms impedance. If in doubt, try the earphone in question: no damage to the receiver will result if it is improper.

If an existing high-impedance earphone is incorporated, we suggest the use of a matching transformer, with input impedance around 300 ohms and output to match your earphone. Considerable mismatch can be tolerated.

ANTENNA

The DR-30 provides an input circuit for an unbalanced 40 to 70 ohm antenna. Almost any piece of wire will give some reception of strong signals, but for optimum performance an antenna designed for the frequencies desired is best. Various amateur publications can provide a vast amount of information for those seeking it.

The antenna inputs require "phono plugs." The shielded types are most desirable and are usually available from audio suppliers if no radio parts store is close by. Several plugs are provided with the receiver.

The antenna for all frequencies in the range 3.5 to 30 Mc. should be plugged into the jack marked ANT., nearest the Jones plug.

The 50 megacycle antenna should be plugged into the jack marked 6 ANT., farthest to the left on the rear of the receiver. Just below the antenna jack is a trimmer capacitor; this should be peaked with a screwdriver for best reception on the particular antenna which is used. This is a tuned circuit peaked around 50.5 Mc. but with sufficient width for most 6-meter operation.

Mobile antennas may be used in the normal fashion. Broadcast whip antennas and many pieces of wire present a very high impedance at short wave frequencies; rarely will operation be good except on stronger signals.

GROUND

A stud and wing nut (6-32) are provided on the rear of the receiver for grounding purposes. Any amateur station's equipment should be safely grounded with heavy copper braid or wire to a cold water pipe or an earth ground to prevent shock hazard.

In addition to this, since the DR-30 is capable of operation without connection to household wiring, it is important to note that for optimum performance the receiver should be grounded in the best method possible even while operating from batteries. Although the great sensitivity of the RF amplifier stages can produce excellent reception under some conditions when not grounded, the full potential of the unit for weak signal reception as well as various image and IF rejection characterictics is realized only when a satisfactory antenna and ground system are employed.

When coaxial feed line is used from the antenna, or a good balanced type of antenna is employed, battery operation may be adequate without a ground. Keep in mind that a radio on the end of a long piece of wire just isn't a complete circuit, RF or otherwise, and a ground is an essential part of the system.

OPERATION----THE FIRST TIME

Double check the polarity and chosen color coding of the power wiring; solder the wires to the Jones Plug terminals. Make the battery-p.s. connections and the loudspeaker connections as indicated.

Insert the Jones plug in the receptacle on the rear of the receiver. Plug some type of wire or antenna (use a phono connector) in the ANT 1 jack. If a piece of wire is used temporarily, make an effort to drape it out a window if in a steel frame building.

Turn the unit on with the panel switch, on the AF Gain control. Move the panel lights switch to the LT. position: see if the lights are working. A polarity diode at the power supply input connection prevents operation and damage from incorrect connection.

PULL the RF Gain control "out"; this is the STBY switch and the receiver does not operate when pushed "in".

Be sure the Notch Tune, RF Gain, ANL Level controls are fully counterclockwise. Choose your band of operation: turn the preselector until the pointer matches the band in use, and, with the audio gain turned up, receiver or antenna noise at that frequency is heard and peaked.

Most controls are self-explanatory, so tune in various types of stations and try the controls which are applicable. After some familiarity is achieved, read the remaining portion of this for more specific details on exact control functions.

CONTROL FUNCTIONS

ON-OFF: rotate the AF Gain control to the right to turn the unit on.

AF Gain: varies the audio output: increased volume clockwise.

RF Gain: actually an attenuator in series with the antenna, permitting adjustment of the amplitude of the signal reaching the RF stage. The maximum receiver sensitivity is obtained when the control is fully COUNTERCLOCKWISE; turning it to the right increases the attenuation, not the sensitivity.

STBY: When the RF Gain control is pushed "in", voltages to circuits other than oscillators is turned off; the oscillators remain functioning for possible use with other equipment. This control effectively mutes the receiver when desired, and terminals on the Jones Plug permit operation of this function by a relay or external switch.

Function Switch:

a three-position rotary switch with the following action:
AM----the AM detector is in use
USB---the product detector is in use, and the USB crystal in the BFO is connected.
LSB---product detector, LSB crystal connected, and the VFO frequency is shifted so that the dial calibration remains

(CONTINUED)

essentially constant.

Selectivity:
The three choices of IF selectivity are provided for optimum interference rejection and fidelity. Approximate bandwidths are indicated; see technical description for details.

Notch Tune:
The notch tune control adjusts the frequency of the rejection notch in the IF passband. This notch is capable of rejecting any single interfering heterodyne or carrier which may be causing interference. The adjustment is critical. When not in use, the control should be turned to the 9 o'clock position.

AGC Hold:
This toggle switch allows the operator to select the decay time of the Automatic Gain Control system. The center position, or fast decay, is used normally for AM reception and band-scanning. The right "hold" position is effective in eliminating thumps and clicks in SSB and CW reception of strong signals, and the decay time is such that the AGC does not bring up the background noise between syllables of speech. The left position provides medium-hold time.

ANL LEVEL:
Adjusts the threshold of the noise blanking action. The ANL is most effective on ignition-type noise, and only on SSB and CW. To place in operation, advance the control clockwise until the noise disappears, but not so far as to reduce the desired signal.

A-B Switch:
As provided, this switch functions as a "tone control" with some reduction of the high audio frequencies in the A position. This can be useful, depending upon the characteristics of the signal, the noise, and the loudspeaker.
The A-B switch is a spdt center-off toggle unit with its center pole connected to the positive side of the receiver power. A lead is brought to the connection plug so the B position can control some accessory equipment, such as an antenna switching relay, a phone patch, or anything where the maximum 5 amps and 115 volts rating of the switch is not exceeded. The tone control function can be disabled by clipping or unsoldering the white wire to the switch.

CAL-LT Switch:
This DPDT switch has a center off position. In the CAL position, the internal 100 kc crystal calibrator is in operation. In order to allow the calibrator signal to reach the RF stage, and to attenuate the signals from the antenna to avoid confusion, the RF Gain control should be rotated to the right as far as necessary. The calibrator should be turned off when not in use to avoid undesired responses.
In the LT. position, the panel lights are turned on. When operating from portable batteries, power consumption is less than half with the lights turned off.

(CONTINUED)

CONTROL FUNCTIONS (cont)

PRESELECTOR:

Used to tune the RF input and output circuits to the desired frequency. In normal use, tune the preselector until the pointer is toward the MC marking which corresponds to the band is use. The final fine adjustment is then made by listening to the antenna noise or observing the S-meter on a received signal. Note that it is possible to tune the preselector to an image frequency causing incorrect reception; always start in the range of the marked frequencies. It is also apparent in use that on the lower bands, particularly, the preselector should be re-peaked when making a wide frequency excursion within the band.

SCREWDRIVER ADJUSTMENTS:

(a) the dial may be corrected as much as 20 kc. by the small trimmer located near the function switch. A small screwdriver should be used.
(b) Notch depth control is in the lower portion of the back panel. It should rarely need adjustment after factory setting.
(c) Calibrator zero trimmer can be adjusted through the small hole in the right side of the back panel. This is best done when WWV can be received strongly enough for a clear zero-beat indication. Only rarely will the calibrator be significantly off frequency.

RECEPTION HINTS

WWV time and frequency standard transmissions can be heard at 10.0 Mc. Reception of this station is useful for zeroing the crystal calibrator and other purposes.

On several of the bands, the preselector is capable of covering not only the desired signal range, but also the image frequency range which is normally rejected. By tuning the preselector to the image frequency rather than the indicated band region, these segments can be heard. Most of these image ranges are not of particular interest for general listening. An important exception occurs in the case of the 9.5-10.050 Mc range. The image for this range is 14.860-15.410 Mc. Tuning is, of course, reversed, but this range includes the popular "19 meter" short wave broadcast band and the 15 Mc WWV frequency.

To calculate the signal frequency from the indicated frequency, look at the crystal chart. Subtract the indicated frequency from the crystal frequency; this is the "IF frequency". Take this figure and add it to the crystal frequency. The result is the image frequency.

Xtal freq.-ind. freq. = IF
Xtal freq.+IF = received image freq.
or, to determine the calibrated freq. for a desired image freq.
desired image freq. - xtal freq. = IF
Xtal freq - IF = indicated freq.
Example: to what freq. must Receiver be tuned to cover 15 MC WWV?
15 Mc - 12.455 Mc = 2.545
12.455 - 2.545 = 9.910. The receiver should be tuned to 9.910 Mc, but with the preselector tuned beyond the calibration for the 14 Mc (20 meter) range.

TYPICAL OPERATION

Single Sideband Reception

AGC Hold: in hold position--to the right
RF GAIN: fully counterclockwise; pulled "out"
PRESELECTOR: peaked on desired frequency: fine adjustment for peaking on noise.
AUDIO GAIN: advanced until background noise is audible
SELECTIVITY: 2.1 kc.
FUNCTION SWITCH: usually LSB for 3.5 and 7 Mc bands, USB for others
NOTCH TUNE: fully counterclockwise
ANL LEVEL: fully counterclockwise
TUNING: operating in the SSB portion of an amateur band, very slowly adjust the tuning control until a voice signal sounds natural. If no tuning adjustment allows this, try changing the function switch to the other SB position.

If a heterodyne appears, null it with the notch control. This tuning is critical due to the sharpness of the notch, and retuning of the main tuning control necessitates retuning the notch. In using the notch in AM reception, note that elimination of either the desired or the undesired carrier stops the whistle: make sure you null the undesired carrier.

If noise is present, advance the ANL LEVEL control as suggested in the Control Function section.

CW Reception

Controls as in SSB reception, but the selectivity control may be in the 2.1 or .5 kc position. When the narrow filter is used, note that one particular audio tone stands out when tuning; this corresponds to the center of the filter bandpass and is the point where the S-meter will read highest. This is a very sharp filter and is most effective in digging a weak station from in the midst of a number of stronger ones or listening in the presence of considerable noise. The Notch and ANL should be used where required.

AM Reception

Function switch: AM position
Selectivity: 5 kc if conditions permit; otherwise treat as if signal were SSB.

The notch is extremely useful in receiving AM under normal crowded conditions. The noise limiter can cause distortion, and is of limited effectiveness on AM. This can be improved by reducing the RF input (turning the RF Gain clockwise) until the AGC is not actuated (little or no S-meter indication).

TECHNICAL DESCRIPTION

The DR-30 receiver is a double-conversion superheterodyne unit with frequency coverage of 12 one-half megacycle bands in the range of 3.5 to 54 megacycles.

Signals from the antenna input J1 pass through the RF GAIN CONTROL and thence to a low-impedance tap on the antenna input coil L1. This high-Q toroidal inductor is tuned by the preselector capacitor to a frequency range of approximately 6.5 Mc. to 17 Mc. For frequencies 2,62:1 ratio lower than this range, capacitors are connected across the toroid by the bandswitch S1; for higher frequencies, inductors are connected. The RF amplifier, Q1, is a field-effect transistor (Type K1504). The field-effect transistor is characterized by a high operating impedance, and is a voltage-operated device similar to a tube. This voltage-operation allows maximum preselector selectivity, since no compromise between power transfer and Q is necessary as would be the case with normal (bipolar) transistors. Additionally, the transfer characteristics of the field-effect transistor approach very closely the theoretical square-law configuration and performance under conditions which lead to cross-modulation and overloading in other devices is markedly superior. Since the field-effect transistor is a majority-carrier device, the shot-noise noted in bipolar transistors is absent, and this field-effect transistor allows extremely low-noise operation even to the UHF region. The output from the RF amplifier is via a tuned circuit similar to the input circuit.

The high frequency conversion oscillator, Q2, is operated in the fundamental mode from crystals up to 18 Mc., and as an overtone oscillator above that, by selecting the collector load as a resistor for fundamental operation and a tuned circuit for overtone. A different tunable collector circuit is provided for each overtone crystal range. The first conversion oscillator is fed to an oscillator amplifier, Q4, which provides correct amplitude and impedance matching for the first mixer.

Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. This is also a field-effect transistor stage, so that the high performance in weak-signal reception and rejection of undesired effects made possible in the RF amplifier are not degraded. The crystal oscillator frequencies on each band are chosen higher than the received signal, and the output range from the mixer is 2.405 to 2.955 Mc. This is fed to a high-Q tuned circuit tracked to the VFO by one section of the main tuning capacitor, C2. A first IF amplifier, Q4a, follows this circuit.

The VFO, or tuning oscillator, Q9, covers a range of 1.950 - 2.500 Mc., and utilizes a high-Q toroidal inductive element for extreme stability. Note that because of the choice of xtal frequencies, when the VFO frequency goes "up", the received frequency goes "down". An amplifier-buffer stage (Q10) for the VFO provides isolation for the tuning oscillator, and the voltage supply to the VFO is regulated by a separate zener regulator

TECHNICAL DESCRIPTION (cont.)

The second mixer combines the VFO and IF and has an output of 455 kc. Tunable IF transformers precede and follow a 455 kc amplifier (Q6) and several fixed-tuned ceramic 455 kc filter-resonators provide additional selectivity.

The output of the 455 kc amplifier is fed to the noise limiter amplifier (Q7) which increases the amplitude and rise time of the noise pulses which read it. Since the effective selectivity is still rather broad at this point, no significant noise pulse lengthening has taken place here, as would be the case if the noise were not eliminated until after the highly selective IF filters. A noise amplifier-detector further processes the noise pulse, providing a pulse output which is used to turn "off" the switching diode gate (D3) for the duration of the noise pulse, effectively muting the receiver during this time. Noise pulses are thereby prevented from actuating the AGC circuits or reducing the receiver sensitivity. The ANL level control adjusts the bias on the gating diode and therefore the noise limiter threshold.

Following the pulse gate several diodes D4, 5, 7, 8, 10, make up a switching network which changes the signal path to the various selectivity paths; DC biasing is applied to the diodes to turn them on or off as required. The broad selectivity incorporates three seramic 455 kc filter resonators plus three IF transformers; the 2.1 kc selectivity path uses the Collins mechanical filter, while the narrowest path for CW reception uses a 455 kc xtal filter in series with the mechanical filter. Other switching diodes are used in the circuit for connecting the mechanical filter to the connector jacks on the rear of the receiver for use with a companion transmitter or other units.

One additional 455 kc IF amplifier (Q12) follows the filters, and precedes the rejection notch circuit. A back-panel screwdriver notch depth control is factory pre-set for best results. This notch is tunable across the IF passband, and provides up to 60 db rejection of an interfering carrier. Since, like the noise limiter, the notch eliminates the interference before the AGC circuitry of the receiver, the AGC is not actuated by the interference but only by the desired signal. The receiver is, therefore, operating at the optimum sensitivity for the desired signal, not the QRM-QRN.

Following the notch circuit is the AGC isolation amplifier, Q20, which prevents the AGC detector (Q21) from causing distortion in the other detectors. The AGC detector itself operates in a bootstrap arrangement to provide the fast-attact adjustable-hold characteristics which are desired. The output of the AGC amplifier varies with signal strength from full B- to 1 volt negative; this control voltage is fed via a voltage divider to the RF stage, the 1st IF amplifier, the 2nd mixer, and the 1st 455 kc amplifier, and is also sent to the S-meter. Hold action for the AGC is adjusted by changing the RD constant of the hold circuit.

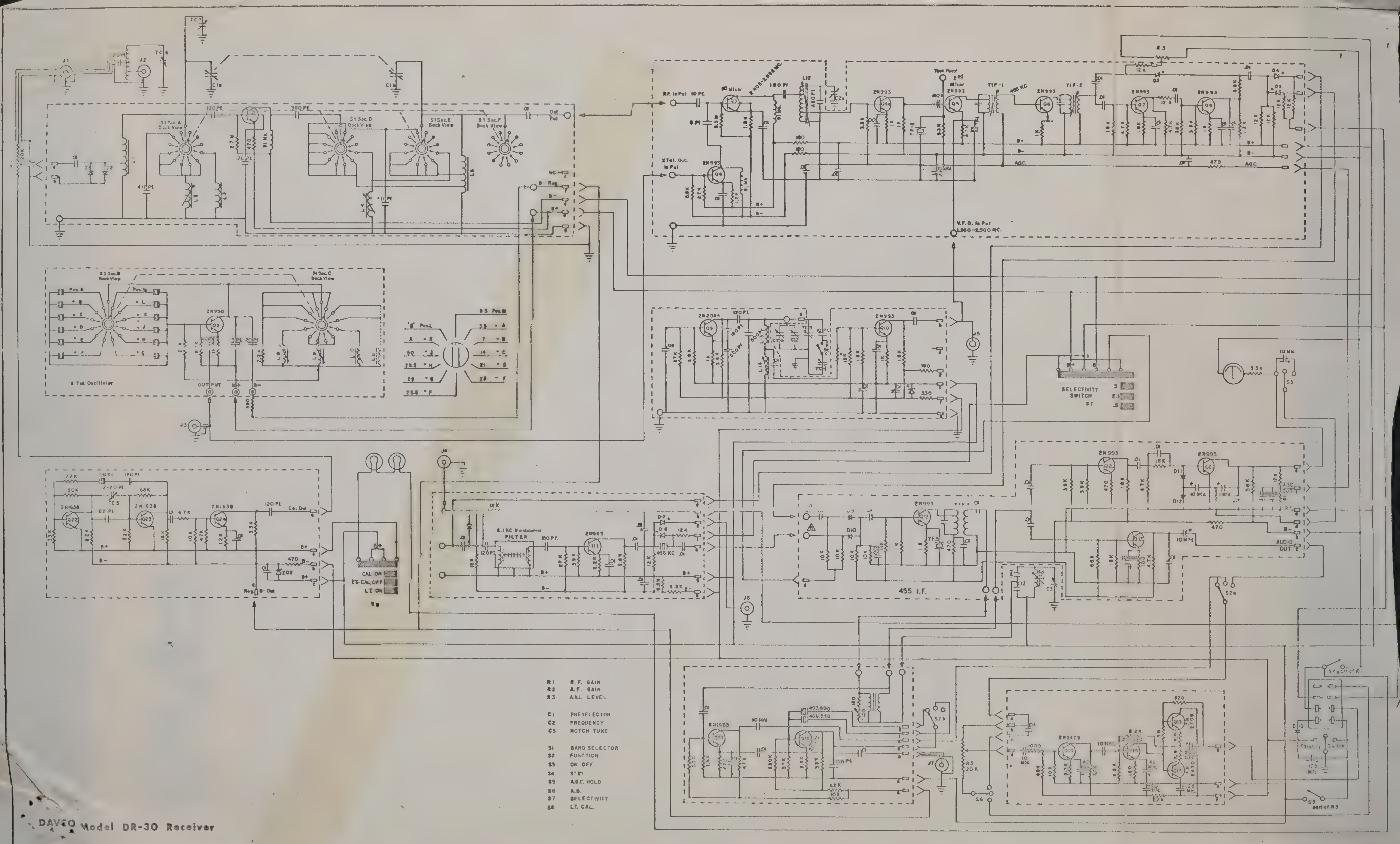
TECHNICAL DESCRIPTION (cont.)

For CW and SSB reception, a crystal BFO-carrier generator signal, (Q19) chosen in relation to the passband of the mechanical filter is injected into the product detector (Q18). A circuit in the VFO shifts that frequency to compensate for the USB and LSB signal-frequency shift. For AM reception, a low-distortion AM detector (Q13) is employed.

The function switch, in addition to shifting the VFO and the BFO crystals, also selects the output of one or the other detectors and feeds them to the audio preamplifier, and thence to the AG Gain control. An additional audio preamp and driver stage then provide the signal for the push-pull transformerless audio output circuit which is designed for low distortion and good communications quality.

MECHANICAL DETAILS

The basis of the DR-30 construction is an extremely rigid solid aluminum extrusion. This extrusion is designed to support the plug-in printed circuit modules, and slots are milled in the massive part for attachment of connectors, panels, and other parts. All parts which require physical stability are attached to this base, and the capacitor frive unit is of similar construction, with a milled aluminum shape holding ball bearings for the drive shafts. All components except controls are mounted on printed circuit boards; G-10 glass epoxy board is used for maximum reliability. The boards may be removed for servicing as a subassembly. Cadmium-plated steel panels are used to support the controls and other parts. Throughout the receiver, components and parts used are operating well below their rated or designed maximum capabilities, thus assuring extreme reliability.



R1	R.F. GAIN
R2	A.F. GAIN
R3	A.N.L. LEVEL
C1	PRESELECTOR
C2	FREQUENCY
C3	NOTCH TUNE
S1	BAND SELECTOR
S2	FUNCTION
S3	ON OFF
S4	ST BY
S5	A.G.C. HOLD
S6	A.B.
S7	SELECTIVITY
S8	LT. CAL.

DAVCO Model DR-30 Receiver

DAVCO
ELECTRONICS INCORPORATED

Manufacturers of precision communications instruments

P. O. Box 2677 - Area Code 904 224-4322
2024 S. Monroe Street, Tallahassee, Florida 32304

NOTICE OF SPECIAL MEETING OF STOCKHOLDERS OF DAVCO ELECTRONICS, INC.

Notice is hereby given that a special meeting of the stockholders of Davco Electronics, Inc. has been called by a majority of the Directors of the Corporation, to be held at the Skyline Restaurant, 2220 West Tennessee Street, Tallahassee, Florida, on Thursday, March 21, 1968 at 5:00 o'clock p.m. for the purpose of considering the following matters of business:

1. Consideration and approval of proposal of the Directors of the Corporation to amend the Articles of Incorporation so as to increase the authorized capital stock of the Corporation from the present amount of $10,000.00, consisting of 10,000 shares of the par value of $1.00 each to $100,000.00, consisting of 100,000 shares of stock of the par value of $1.00 each.

2. Consideration and approval of a proposal of the Directors of the Corporation to issue and exchange shares of stock for the Corporation's notes now held by stockholders of the Corporation upon the basis of 3.43 shares of stock for each $100.00 of outstanding indebtedness represented by the face value of the Corporation's notes without interest.

3. Consideration and approval of proposal of the Directors to authorize the offer at $1.00 per share of sale by the Corporation to each of the present stockholders of a sufficient number of shares of stock so that each stockholder may retain his present percentage of ownership in the Corporation as of a time prior to any issuance of stock as outlined in the following paragraph.

4. Consider and approve the proposal of the Directors that Davco Electronics, Inc. enter into an agreement with Henry Tomlinson and Clay Tomlinson outlined generally as follows:

(a) Henry Tomlinson and Clay Tomlinson, who have experience and skill in the management, design and production of electronic products will assume active management of the Corporation; they will provide management and engineering services for the redesign of existing Davco products; supervise prototype production of redesigned products; set up production lines and systems for mass production of products; set up promotion and advertising schedules; make provision for purchasing, with quantity discounts, up-dated components to be used in production of redesigned products; provide production facilities and labor for prototypes of redesigned Davco products.

(b) At the time of the execution of the agreement the Corporation will issue and deliver to Henry Tomlinson and Clay Tomlinson the number of shares of its capital stock which will then equal fifty-one per cent (51%) of the total outstanding shares of stock of the Corporation, the consideration for which will be the services to be rendered to the Corporation by them, and $10.00 in cash.

(c) At the time of execution of the agreement the Corporation will make available $10,000.00 in cash, one-half of which shall be placed in escrow for the payment monthly of the salary of the plant manager for a period of six months and the other one-half of which will be used for payment of the expenses of the Corporation in connection with the redesign of existing Davco products and the prototype production thereof. Six months after the execution of the agreement the Corporation will make available an additional $10,000.00 in cash, one-half of which shall be placed in escrow for the payment monthly of the salary of the plant manager for a period of six months and the other one-half of which will be used for payment of the expenses of the Corporation in connection with the redesign of existing Davco products and the prototype production thereof.

(d) The work provided in the timetable attached hereto and by reference made a part hereof will be performed by the Corporation under the management and with the cooperation

of Henry Tomlinson and Clay Tomlinson, who will serve the Corporation without salary until October 1, 1968, or until the items covered by the timetable have been completed, whichever is later; with the exception that if projects other than those specified in the timetable should be undertaken by the Corporation before October 1, 1968 adequate compensation for the services of Henry Tomlinson and Clay Tomlinson would be arranged.

(e) Henry Tomlinson and Clay Tomlinson will actively pursue on behalf of the Corporation the design and development of future projects in the communications field beyond October 1, 1968 on a continuing basis and all future developments in the field of communications shall be the property of the Corporation. Henry Tomlinson and Clay Tomlinson will make such assignments or take such other action as may be necessary to grant or protect the property of the Corporation with respect to all future developments in the field of communications. The Corporation shall not have an interest in future developments by Henry Tomlinson or Clay Tomlinson in any field other than that of communications and all future developments in fields other than of communications shall be assigned to Tomlinson Research Instruments Corporation or such other person, firm or corporation as Henry Tomlinson or Clay Tomlinson should designate.

(f) During the period of redesign and repackaging of the several receivers for which there are standing orders the facilities at Tomlinson Research Instruments Corporation will be made available to Davco by Henry Tomlinson and Clay Tomlinson.

5. To consider and approve the amendment of Article II, Section 1 of the By-Laws to read as follows:

Section 1. NUMBER. The affairs and business of this Corporation shall be managed by a Board of Directors, the number of which shall be fixed from time to time by a vote of the stockholders, but which shall be not less than three (3) nor more than fifteen (15). No director need be a stockholder of the corporation, but at least one (1) of such directors shall be a resident of the State of Florida and a citizen of the United States.

6. To elect Directors of the Corporation who shall serve until their successors have been elected. The following have been proposed for election as Directors of the Corporation:

1. M. M. Ashcroft
2. Homer A. Brinkley
3. Robert T. Brinkley
4. Charles H. Hubbard
5. John J. Koelemij
6. George Langford
7. B. C. Lewis
8. Sidney W. Mendelson
9. Cyril V. Smith
10. Edna T. Smith
11. Samuel E. Teague
12. Theo Titus
13. Clay Tomlinson
14. Henry Tomlinson

7. To consider and transact such other business as may come before the meeting in connection with the matters outlined herein or as the Corporation may transact pursuant to this Notice.

March 8, 1968

DAVCO ELECTRONICS, INC.

By Cyril V. Smith
President

Sidney W. Mendelson
Secretary

TIMETABLE

April 1-May 1	Repair all receivers returned to Davco by customers, ship receivers back to customers.
	Negotiate with FSU regarding Radio-Astronomy project, determine course of action.
	Divide receiver development project into (1) mechanical (2) electrical and (3) assembly catagories and assign work.
May 1-June 1	Finalize FSU Radio-Astronomy Project.
	Complete prototype receiver (DR-50A)
	Take new prototype of DR-50A to VOA and receive their approval on new version.
June 1-July 1	Finalize design and complete prototype of DR-30A.
	Order advertising for August
	Contact customer prospects in Davco file.
July 1-Aug. 1	Begin construction of 50 each DR-30A and DR-50A receivers using fabrication facilities at TRI setting up an assembly facility for new corporation.
	Move remaining stock of parts from Davco warehouse to new corporation shop.
Aug. 1-Sept. 1	Begin delivery from first 100 units
	Survey total market
	Start sales to distributors, begin production planning
Sept. 1-Oct. 1	Start on Transmitter

MOTOROLA
Semiconductors
BOX 955 • PHOENIX, ARIZONA 85001

3N157 30.V
3N157A 50V
3N158
3N158A

Substitute for [illegible]
K1501 RF AMP

P-CHANNEL

① will need to select 2.7 meg

MOS FIELD-EFFECT
TRANSISTORS
TYPE C

Gate [illegible] resistor to get 2.7
I [illegible] in 47 [illegible]
DRAIN RESISTOR

MARCH 1968 – DS 5267

② base connection are the same.

P-CHANNEL SILICON NITRIDE PASSIVATED MOS FIELD-EFFECT TRANSISTORS

RF AMP

Enhancement Mode (Type C) transistors designed for amplifier and switching applications.

P-CH ENHANCEMENT

- High Drain-Source Voltage –
  3N157A
  3N158A – $V_{(BR)DSS}$ = 50 Vdc (Min)
- Low Gate Reverse Current – I_{GSS} = 10 pAdc (Max)
- Low Zero-Gate Voltage Drain Current –
  3N157A
  3N158A – I_{DSS} = 0,25 nAdc (Max)
- Low Reverse Transfer Capacitance – C_{rss} = 1.3 pF (Max)

DESIGNERS DATA FOR "WORST CASE" CONDITIONS

The Designers† Data Sheet permits the design of most circuits entirely from the information presented. Limit curves – representing boundaries on device characteristics – are given to facilitate "worst case" design.

MAXIMUM RATINGS

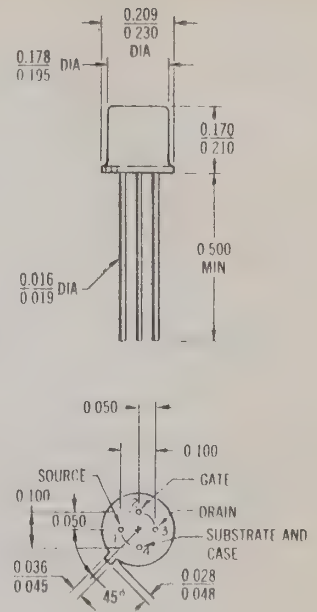
50.V

Rating	Symbol	3N157 3N158	3N157A 3N158A	Unit
Drain-Source Voltage	V_{DS}	±35	±50	Vdc
Drain-Gate Voltage	V_{DG}	±35	±50	Vdc
Gate-Source Voltage	V_{GS}	±25		Vdc
Drain Current	I_D	30		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	300 1.7		mW mW/°C
Operating Junction Temperature Range	T_J	-65 to +175		°C
Storage Temperature Range	T_{stg}	-65 to +200		°C

HANDLING PRECAUTIONS:

MOS field-effect transistors have extremely high input resistance. They can be damaged by the accumulation of excess static charge. Avoid possible damage to the devices while handling, testing, or in actual operation, by following the procedures outlined below:

1. To avoid the build-up of static charge, the leads of the devices should remain shorted together with a metal ring except when being tested or used.
2. Avoid unnecessary handling. Pick up devices by the case instead of the leads.
3. Do not insert or remove devices from circuits with the power on because transient voltages may cause permanent damage to the devices.



TO-72
CASE 20 (2)

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†Trademark of Motorola Inc.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage (I_D = -10 µAdc, $V_G = V_S = 0$) 3N157, 3N158 3N157A, 3N158A	$V_{(BR)DSS}$	-35 -50	- -	- -	Vdc
Gate Reverse Current (V_{GS} = +25 Vdc, V_{DS} = 0)	I_{GSS}	-	-	+10	pAdc
Zero-Gate Voltage Drain Current (V_{DS} = -15 Vdc, V_{GS} = 0) 3N157, 3N158 3N157A, 3N158A	I_{DSS}	- -	- -	-1.0 -0.25	nAdc
(V_{DS} = -35 Vdc, V_{GS} = 0) 3N157, 3N158		-	-	-10	µAdc
(V_{DS} = -50 Vdc, V_{GS} = 0) 3N157A, 3N158A		-	-	-10	
Input Resistance (V_{GS} = -25 Vdc)	R_{GS}	-	$1 \times 10^{+12}$	-	Ohms
ON CHARACTERISTICS					
Gate-Source Threshold Voltage (V_{DS} = -15 Vdc, I_D = -10 µAdc) 3N157, 3N157A 3N158, 3N158A	$V_{GS(TH)}$	-1.5 -3.0	2.35 TYP 4 Typ	-3.2 -5.0	Vdc
Gate-Source Voltage (V_{DS} = -15 Vdc, I_D = -0.5 mAdc) 3N157, 3N157A 3N158, 3N158A	V_{GS}	-1.5 -3.0	~2.0v operating 5.v	-5.5 -7.0	Vdc
Gate Forward Current (V_{GS} = -25 Vdc, V_{DS} = 0)	$I_{G(f)}$	-	-	-10	pAdc
(V_{GS} = -25 Vdc, V_{DS} = 0, T_A = +55°C)		-	-	-10	nAdc
"ON" Drain Current (V_{DS} = -15 Vdc, V_{GS} = -10 Vdc)	$I_{D(on)}$	-5.0	-	-	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance (V_{DS} = -15 Vdc, I_D = -2.0 mAdc, f = 1.0 kHz)	$\lvert y_{fs} \rvert$	1000	-	4000	µmhos
(V_{DS} = -15 Vdc, V_{GS} = -15 Vdc, f = 1.0 kHz)		1800	-	-	
Output Admittance (V_{DS} = -15 Vdc, I_D = -2.0 mAdc, f = 1.0 kHz)	$\lvert y_{os} \rvert$	-	-	60	µmhos
Input Capacitance (V_{DS} = -15 Vdc, V_{GS} = 0, f = 140 kHz)	C_{iss}	-	-	5.0	pF
Reverse Transfer Capacitance (V_{DS} = -15 Vdc, V_{GS} = 0, f = 140 kHz)	C_{rss}	-	-	1.3	pF
Drain-Substrate Capacitance ($V_{D(sub)}$ = -10 Vdc, f = 140 kHz)	$C_{d(sub)}$	-	-	4.0	pF
Noise Voltage (R_S = 0, BW = 1.0 Hz, V_{DS} = -15 Vdc, I_D = -2.0 mAdc, f = 100 Hz)	e_n	-	300	-	NV/$\sqrt{Hz}$
(R_S = 0, BW = 1.0 Hz, V_{DS} = -15 Vdc, I_D = -2.0 mAdc, f = 1.0 kHz)		-	120	500	

FIGURE 1 – FORWARD TRANSCONDUCTANCE

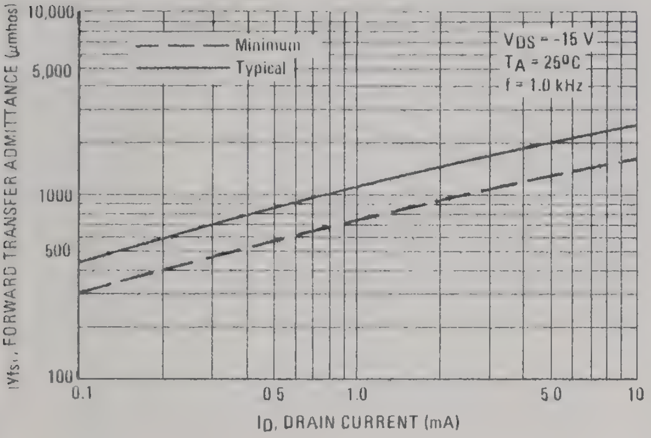

FIGURE 2 – OUTPUT TRANSCONDUCTANCE

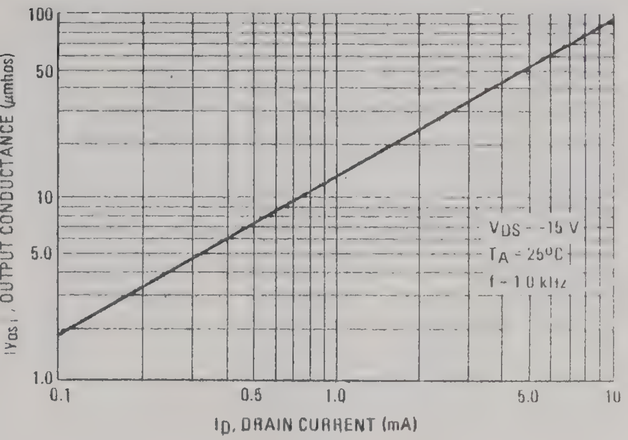

FIGURE 3 – FORWARD TRANSCONDUCTANCE versus TEMPERATURE

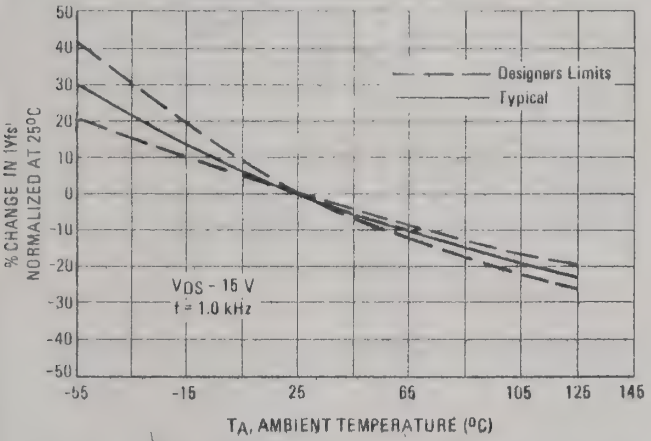

FIGURE 4 – BIAS CURVE

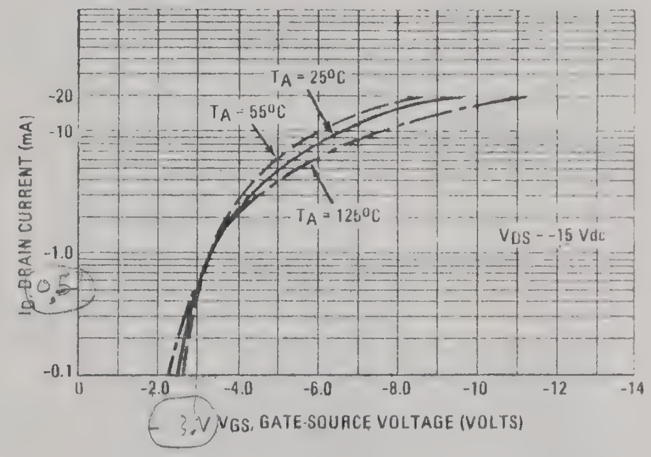

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FIGURE 5 – "ON" DRAIN-SOURCE VOLTAGE

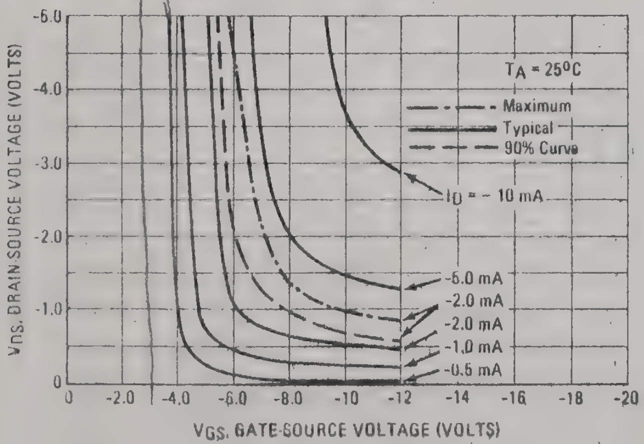
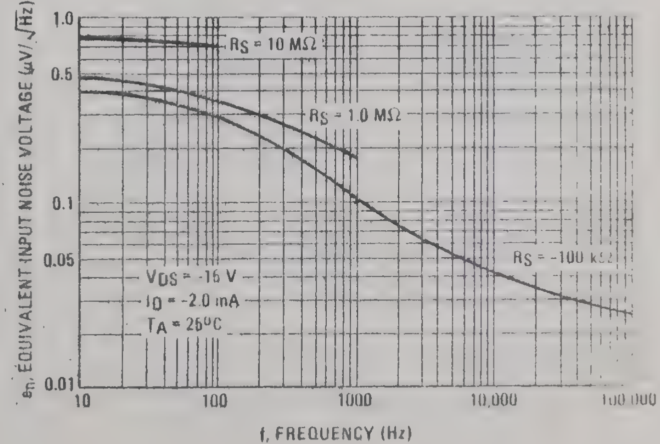


FIGURE 6 – EQUIVALENT INPUT NOISE VOLTAGE



SWITCHING CHARACTERISTICS

($T_A = 25°C$)

FIGURE 7 – TURN-ON DELAY TIME

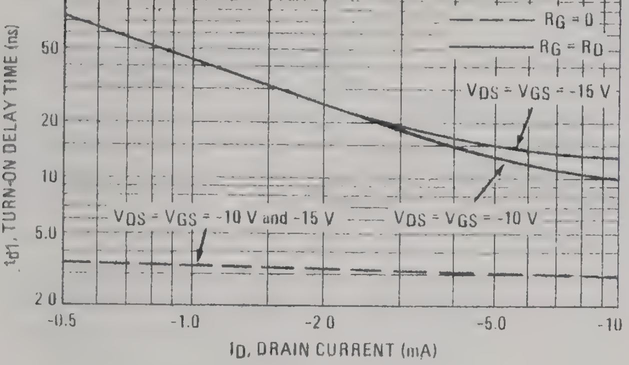


FIGURE 8 – RISE TIME

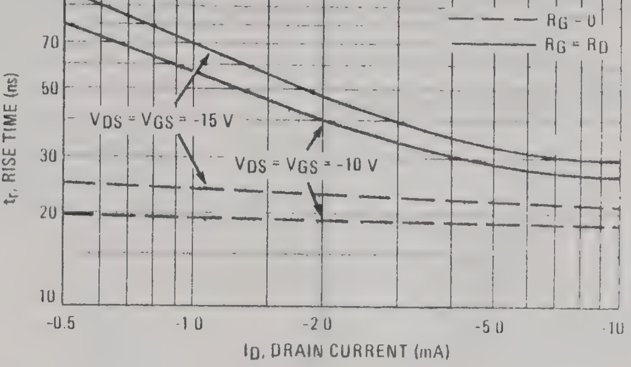


FIGURE 9 – TURN-OFF DELAY TIME

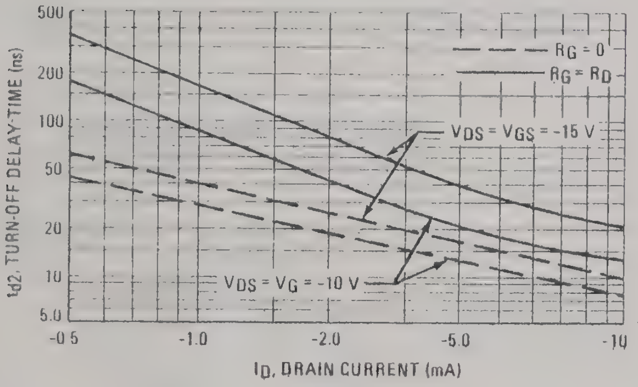


FIGURE 10 – FALL TIME

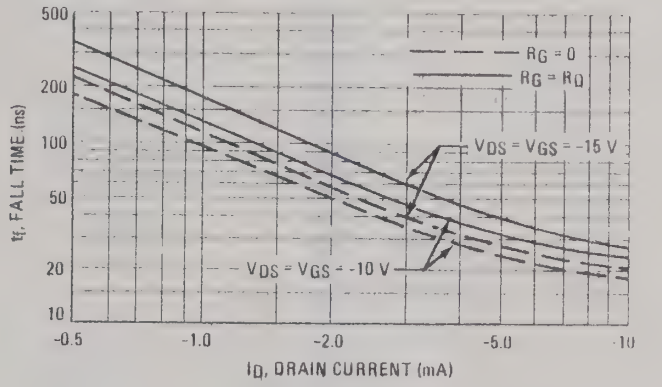
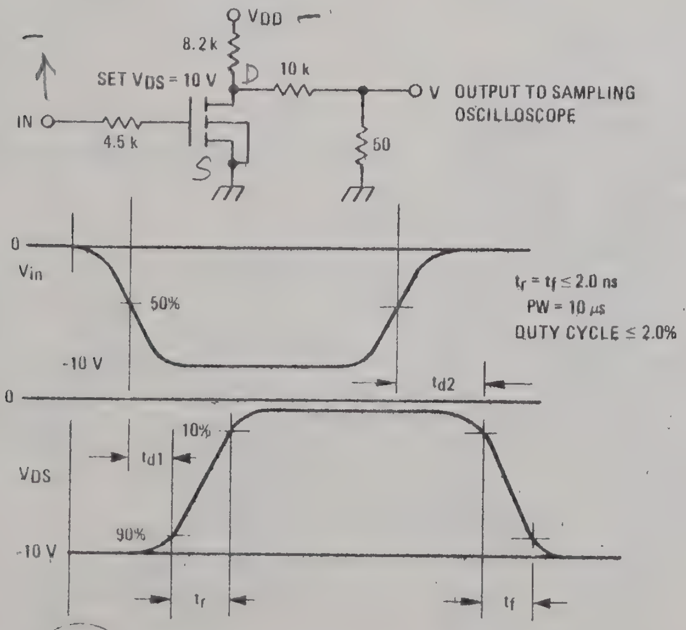


FIGURE 11 – SWITCHING CIRCUIT and WAVEFORMS



The switching characteristics shown above were measured in a test circuit similar to Figure 11. At the beginning of the switching interval, the gate voltage is at ground and the gate source capacitance ($C_{gs} = C_{iss} - C_{rss}$) has no charge. The drain voltage is at V_{DD}, and thus the feedback capacitance (C_{iss}) is charged to V_{DD}. Similarly, the drain substrate capacitance ($C_{d(sub)}$) is charged to V_{DD} since the substrate and source are connected to ground.

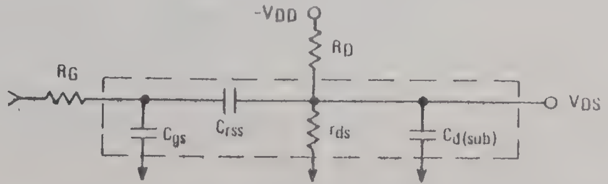
During the turn on interval, C_{gs} is charged to V_{GS} (the input voltage) through R_G (generator impedance) (Figure 12). C_{rss} must be discharged to V_{GS} $V_{D(on)}$ through R_G and the parallel combination of the load resistor (R_D) and the channel resistance (r_{ds}). In addition, $C_{d(sub)}$ is discharged to a low value ($V_{D(on)}$) through R_D in parallel with r_{ds}. During turn-off this charge flow is reversed.

Predicting turn-on time proves to be somewhat difficult since the channel resistance (r_{ds}) is a function of the gate-source voltage (V_{GS}). As C_{gs} becomes charged V_{GS} is approaching V_{in} and r_{ds} decreases (see Figure 5) and since C_{rss} and $C_{d(sub)}$ are charged through r_{ds}, turn-on time is quite non linear.

If the charging time of C_{gs} is short compared to that of C_{rss} and $C_{d(sub)}$, then r_{ds} (which is in parallel with R_D) will be low compared to R_D during the switching interval and will largely determine the turn-on time. On the other hand, during turn off r_{ds} will be almost an open circuit requiring C_{rss} and $C_{d(sub)}$ to be charged through R_D and resulting in a turn-off time that is long compared to the turn on time. This is especially noticeable for the curves where $R_G = 0$ and C_{gs} is charged through the pulse generator impedance only.

The switching curves shown with $R_G = R_D$ simulate the switching behavior of cascaded stages where the driving source impedance is normally the same as the load impedance. The set of curves with $R_G = 0$ simulates a low source impedance drive such as might occur in complementary logic circuits.

FIGURE 12 – SWITCHING CIRCUIT with MOSFET EQUIVALENT MODEL



Kmc semiconductor corporation

K1501
K1502 K1504
June 18, 1978

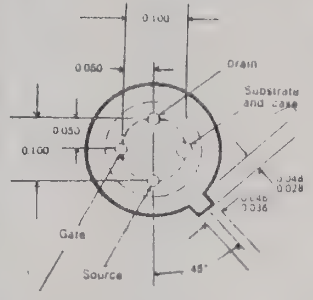
VHF
INSULATED GATE
FIELD EFFECT
TRANSISTOR

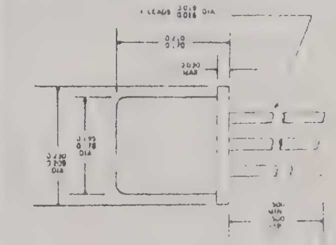
RF AMP

P-CHAN N.F, 6dB at 25MHz
ENHANCEMENT

GENERAL DESCRIPTION

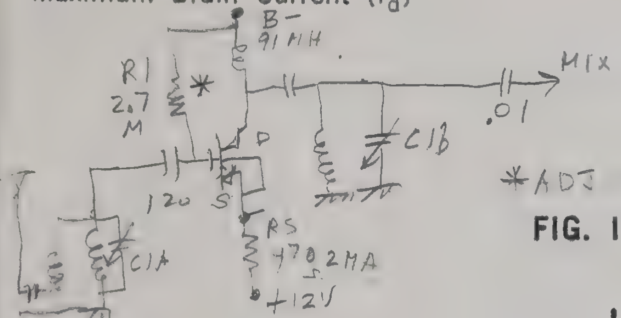
The K1500 transistors are P-channel MOS field effect types, designed to be operated in the enhancement mode. The extremely high input impedance and low channel resistance provide flexibility in circuit design. VHF amplifier performance features low noise characteristics.





ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures	
Operating Junction Temperature	175°C
Storage Temperature	—55°C to 175°C
Maximum Power Dissipation at 25°C Case	150 mw
Maximum Voltages	
V_{ds} (Drain to source voltage)	15 volts
V_{gs} (Gate to source voltage)	50 volts
Maximum Drain Current (I_d)	35 ma



*ADJ R1 TO GET 2MA or [illegible] in P [illegible].

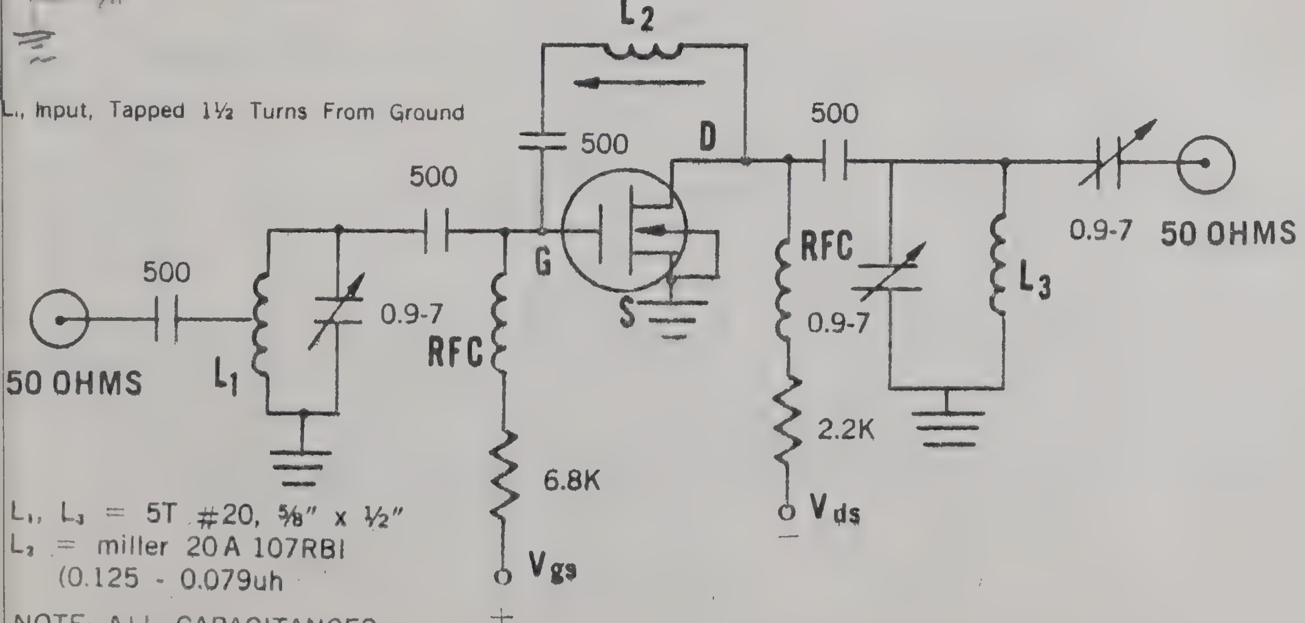


FIG. I

L₁, Input, Tapped 1½ Turns From Ground

L₁, L₃ = 5T #20, ⅝" x ½"
L₂ = miller 20A 107RBI
(0.125 - 0.079uh

NOTE: ALL CAPACITANCES
SHOWN ARE pf.

Kmc

ELECTRICAL CHARACTERISTICS @ 25°C

SYMBOL	CHARACTERISTIC	K1501 MIN.	K1501 TYP.	K1501 MAX.	K1502 MIN.	K1502 TYP.	K1502 MAX.	K1504 MIN.	K1504 TYP.	K1504 MAX.	UNITS
V_{GST}	Gate Threshold Voltage	−3	−4.5	−7	−3	−4.5	−7	−2	−4	−8	volts
G_m	AC Transconductance @ $V_{GS} = -10V$, $_{DS} = -10V$	1,000	2,000	—	1,000	2,000	—	800	2,000	—	umhos
I_{DSS}	Drain Leakage Current $V_{GS} = 0$, $V_{DS} = -10V$	—	.07	10	—	.07	10	—	.07	10	na
R_{GS}	Gate Leakage Resistance	10^{12}	10^{14}	—	10^{12}	10^{14}	—	10^{12}	10^{14}	—	ohms
R_d	Dynamic Drain Resistance	4,000	8,000	—	4,000	8,000	—	4,000	8,000	—	ohms
C_{gs}	Gate-Source Capacitance	—	3.0	4.5	—	3.0	4.5	—	2.0	4.5	pf
C_{gd}	Gate-Drain Capacitance (Y_{RS}) $V_G = 0V$, $V_{DS} = -10v$.	—	0.4	1.0	—	0.4	1.0	—	0.4	1.0	pf
C_{ds}	Drain-Source Capacitance	—	1.5	2.0	—	1.5	2.0	—	1.5	2.0	pf
NF	200mc Noise Figure NOTE 1 @ $V_{DS} = -15V$, $I_{DS} = 2.5ma$	—	4 Low [illegible]	5	—	5	6	—	6	8	db
P_G	200mc Power Gain NOTE 1 @ $V_{DS} = 15V$, $I_{DS} = 2.5ma$ Rg = 50 ohms	9	10	—	8	9	—	6	8	—	db
R_c	Channel Resistance, @ $V_{GS} = -10V$ $V_{DS} = 1$	—	300	600	—	400	800	—	700	1500	ohms

NOTE 1—As measured in 200mc circuit—See Fig. 1.

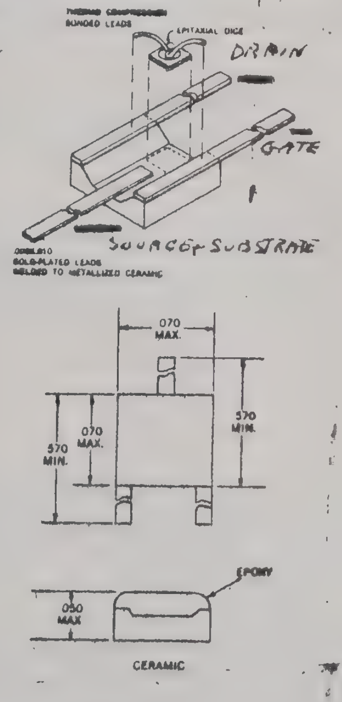
ALL TESTS AT 25° C. ±3° C. AMBIENT, UNLESS OTHERWISE STATED.

ARAMETER	CONDITION	MIN.	MAX.	UNITS
UNCTION EMP.		-55	+150	°C

ALL OTHER PARAMETERS THE SAME AS K1504

REV.	DESCRIPTION	DATE	APP'D.
0	ORIGINAL GS 12/6/66	12/6/66 12/6/66 12/6/66	JWO WG

NOTES:



TYPE	PART NO.
P CHANNEL ENHANCEMENT	K1504C

CASE SIZE	CUSTOMER PART NO.	REV.
CHANNEL (see notes)		

Kmc SEMICONDUCTOR CORPORATION

Harry A. Winship, K5HML/9
4256 Jamie Court
Indianapolis, IN 46226
June 8, 1978

Dear Everest,

I'm sorry I took so long to send you the inclosed data sheets. You and Evan will probably find them useful to get the DR-30 working again. The 3N157 or 3N158 should work satisfactorily in place of the KMC Semiconductor K1504. A 3N128 should perform well in place of the K1004 in the 1st Mixer. Note that the K1504 was a P-Channel IGFET designed to operate in the enhancement mode. I guess that accounted for the super-low noise level of the receiver front end --- when no signals were being received, the P-channel was pinched off and not conducting. The receiver front end operated only while signals were being received.

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I would still like very much to get in touch with Jim Lovette. If you have his address and could send it to me, I would really appreciate it.

It was a real pleasure talking to you on the phone and I appreciate the help and information. If Evan and I could work together on this little project, we both could probably get our receivers working just like new.

All the best to you and your family.

Sincerely,

DAVCO DR-30 COMMUNICATIONS RECEIVER

TECHNICAL DESCRIPTION

The DR-30 receiver is a double-conversion superheterodyne unit with frequency coverage of 12 one-half megacycle bands in the range of 3.5 to 54 megacycles.

Signals from the antenna input J1 pass through the RF GAIN CONTROL and thence to a low-impedance tap on the antenna input coil L1. This high-Q toroidal inductor is tuned by the preselector capacitor to a frequency range of approximately 6.5 Mc. to 17 Mc. For frequencies lower than this range, capacitors are connected across the toroid by the bandswitch S1; for higher frequencies, inductors are connected. The RF amplifier, Q1, is a field-effect transistor (Type K1504). The field-effect transistor is characterized by a high operating impedance, and is a voltage-operated device similar to a tube. This voltage-operation allows maximum preselector selectivity, since no compromise between power transfer and Q is necessary as would be the case with normal (bipolar) transistors. Additionally, the transfer characteristics of the field-effect transistor approach very closely the theoretical square-law configuration and performance under conditions which lead to cross-modulation and overloading in other devices is markedly superior. Since the field-effect transistor is a majority-carrier device, the shot-noise noted in bipolar transistors is absent, and this field-effect transistor allows extremely low-noise operation even to the UHF region. The output from the RF amplifier is via a tuned circuit similar to the input circuit.

The high-frequency conversion oscillator, Q2, is operated in the fundamental mode from crystals up to 18 Mc., and as an overtone oscillator above that, by selecting the collector load as a resistor for fundamental operation and a tuned circuit for overtone. A different tunable collector circuit is provided for each overtone crystal range. The first conversion oscillator is fed to an oscillator amplifier, Q4, which provides correct amplitude and impedance matching for the first mixer.

Signals from the xtal oscillator and the RF amplifier are combined in the first mixer. This is also a field-effect transistor stage, so that the high performance in weak-signal reception and rejection of undesired effects made possible in the RF amplifier are not degraded. The crystal oscillator frequencies on each band are chosen higher than the received signal, and the output range from the mixer is 2.405 to 2.955 Mc. This is fed to a high-Q tuned circuit tracked to the VFO by one section of the main tuning capacitor, C2. A first IF amplifier, Q4a, follows this circuit.

The VFO, or tuning oscillator, Q9, covers a range of 1.950 - 2.500 Mc., and utilizes a high-Q toroidal inductive element for extreme stability. Note that because of the choice of xtal frequencies, when the VFO frequency goes "up", the received frequency goes "down". An amplifier-buffer stage (Q10) for the VFO provides isolation for the tuning oscillator, and the voltage supply to the VFO is regulated by a separate zener regulator.

The second mixer combines the VFO and IF and has an output of 455 kc. Tunable IF transformers precede and follow a 455 kc amplifier (06) and several fixed-tuned ceramic 455 kc filter-resonators provide additional selectivity.

The output of the 455 kc amplifier is fed to the noise limiter amplifier (Q7) which increases the amplitude and rise time of the noise pulses which reach it. Since the effective selectivity is still rather broad at this point, no significant noise pulse lengthening has taken place here, as would be the case if the noise were not eliminated until after the highly selective IF filters. A noise amplifier-detector further processes the noise pulse, providing a pulse output which is used to turn "off" the switching diode gate (D3) for the duration of the noise pulse, effectively muting the receiver during this time.. Noise pulses are thereby prevented from actuating the AGC circuits or reducing the receiver sensitivity. The ANL level control adjusts the bias on the gating diode and therefore the noise limiter threshold.

Following the pulse gate several diodes D4, 5, 7, 8, 10, make up a switching network which changes the signal path to the various selectivity paths; DC biasing is applied to the diodes to turn them on or off as required. The broad selectivity incorporates three ceramic 455 kc filter resonators plus three IF transformers; the 2.1 kc selectivity path uses the Collins mechanical filter, while the narrowest path for CW reception uses a 455 kc xtal filter in series with the mechanical filter. Other switching diodes are used in the circuit for connecting the mechanical filter to the connector jacks on the rear of the receiver for use with a companion transmitter or other units.

TECHNICAL DESCRIPTION (cont)

One additional 455 kc IF amplifier (Q12) follows the filters, and precedes the rejection notch circuit. A back-panel screwdriver notch depth control is factory pre-set for best results. This notch is tunable across the IF passband, and provides up to 60 db rejection of an interfering carrier. Since, like the noise limiter, the notch eliminates the interference before the AGC circuitry of the receiver, the AGC is not actuated by the interference but only by the desired signal. The receiver is, therefore, operating at the optimum sensitivity for the desired signal, not the QRM-QRN.

Following the notch circuit is the AGC isolation amplifier, Q20, which prevents the AGC detector (Q21) from causing distortion in the other detectors. The AGC detector itself operates in a bootstrap arrangement to provide the fast-attack adjustable-hold characteristics which are desired. The output of the AGC amplifier varies with signal strength from full B- to 1 volt negative; this control voltage is fed via a voltage divider to the RF stage, the 1st IF amplifier, the 2nd mixer, and the 1st 455 kc amplifier, and is also sent to the S-meter. Hold action for the AGC is adjusted by changing the RC constant of the hold circuit.

For CW and SSB reception, a crystal BFO-carrier generator signal (Q19) chosen in relation to the passband of the mechanical filter is injected into the product detector (Q18). A circuit in the VFO shifts that frequency to compensate for the USB and LSB signal-frequency shift. For AM reception, a low-distortion AM detector (Q13) is employed.

The function switch, in addition to shifting the VFO and the BFO crystals, also selects the output of one or the other detectors and feeds them to the audio preamplifier, and thence to the AF Gain control. An additional audio preamp and driver stage then provide the signal for the push-pull transformerless audio output circuit which is designed for low distortion and good communications quality.

MECHANICAL DETAILS

The basis of the DR-30 construction is an extremely rigid solid aluminum extrusion. This extrusion is designed to support the plug-in printed circuit modules, and slots are milled in the massive part for attachment of connectors, panels, and other parts. All parts which require physical stability are attached to this base, and the capacitor drive unit is of similar construction, with a milled aluminum shape holding ball bearings for the drive shafts. All components except controls are mounted on printed circuit boards; G-10 glass epoxy board is used for maximum reliability. The boards may be removed for servicing as a subassembly. Cadmium-plated steel panels are used to support the controls and other parts. Throughout the receiver, components and parts used are operating well below their rated or designed maximum capabilities, thus assuring extreme reliability.

New, compact, high performance solid-state receiver for amateur applications

Featuring FIELD-EFFECT TRANSISTORS

FEATURES:

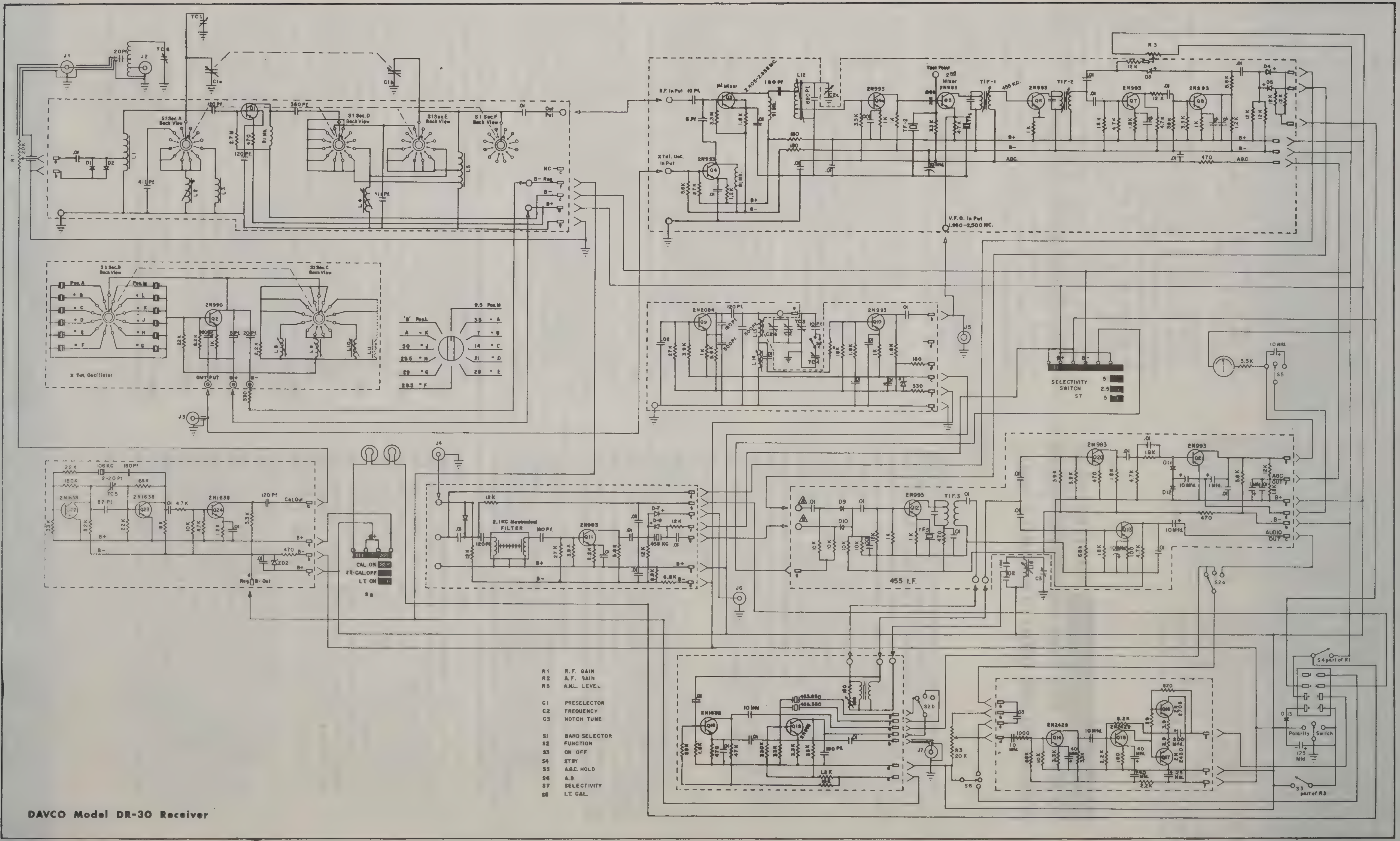
• Complete ham-band coverage 80-10 meters and portion of 6 meters • Standard-equipment 9.5-10.5 Mc band provides WWV and 31 meter SWL band • Three position selectivity for optimum fidelity and QRM rejection • Crystal-controlled BFO; separate AM and Product detectors; AF and RF gain controls • Full AGC with selectable decay time; S-Meter; illuminated dial • Flywheel tuning drive with high-ratio split gears; direct calibration on all bands • Tunable rejection notch filter; extremely effective noise limiter • Transmitter type VFO; crystal controlled first oscillator; built in crystal calibrator • Low power consumption, permitting 12V battery operation when desired; AC supply available • Full transistorization, diode selectivity switching, plug-in module construction, highest quality components • Rugged, stable extruded aluminum chassis for extreme stability; textured grey metal cabinet; FULLY GUARANTEED.

Davco's "Amateur-Engineered" DR-30 provides the maximum in communications effectiveness under the most rigorous operating conditions, all in an exceptionally compact unit. (Only 4" H x 7⅛" W x 6" D.) The Field-Effect Transistor is a revolutionary new solid-state device which combines all the advantages of both tubes and conventional transistors and eliminates their disadvantages. The use of the FET in the DR-30 RF stages provides greater sensitivity, better image rejection and exceptional freedom from cross modulation or overloading on strong signals. Engineered to meet the needs of the most demanding amateurs, no matter the preference in bands or modes of operation.

DAVCO DR-30 RECEIVER $389⁵⁰

For further information and illustrated brochure, write:

DAVCO ELECTRONICS, INC.
P.O. Box 2677, 2024 South Monroe Street
Tallahassee, Florida 32304



DAVCO Model DR-30 Receiver

R1	R.F. GAIN
R2	A.F. GAIN
R3	A.N.L. LEVEL
C1	PRESELECTOR
C2	FREQUENCY
C3	NOTCH TUNE
S1	BAND SELECTOR
S2	FUNCTION
S3	ON OFF
S4	STBY
S5	A.G.C. HOLD
S6	A.B.
S7	SELECTIVITY
S8	LT. CAL.

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All the best to you and your family.

Sincerely,

Harry Winship

May 27-1978

Harry Winship 4256 Jamie Ct, fone 317-897-4568
Indianapolis, Ind. 46226 K5HML/9
Restoring Davco DR30 which has RF FET board.
missing and mixer FET board modified severly.
Suggests using MOT 3N157, -8 or A for RF and MOT 3N128 for MIXER FET

June 18 57 30V OK

Keith W. Evans Box 596 Blairsville ga 30512
was production mgr. for Davco in Florida.

776. University ave Los altos Cal 94022 res.
James Lovette his own electronics company +
consults, travels to Tiwan, China, Japan, Korea
James thought up the Davco Co and receiver.

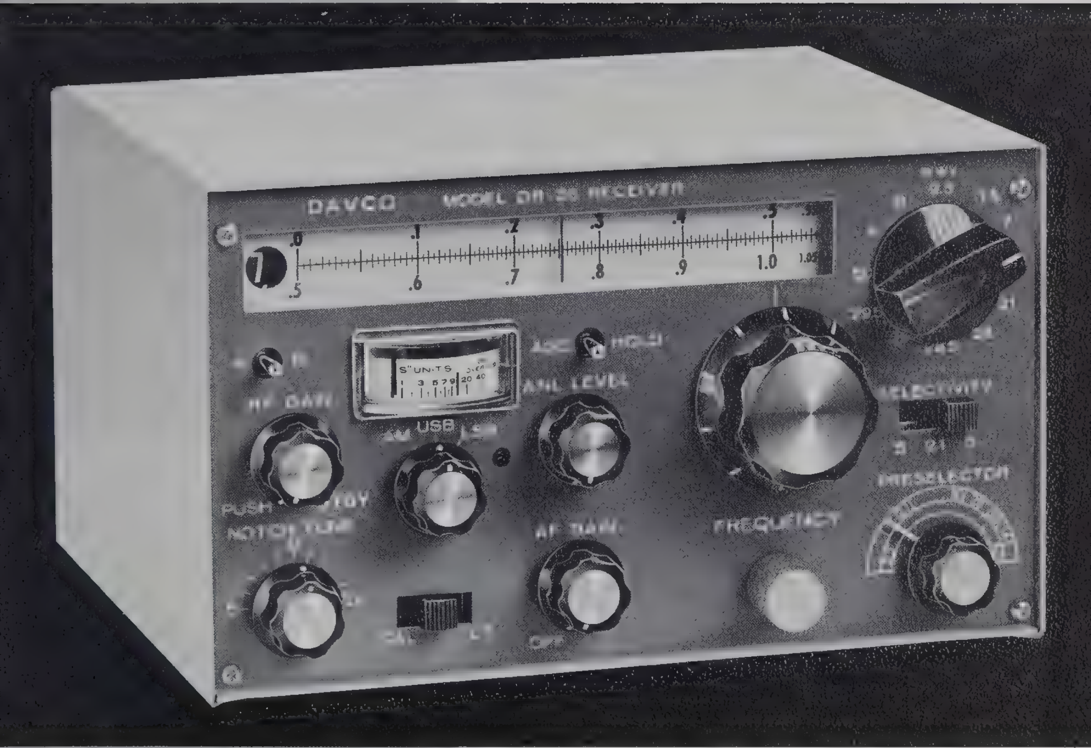
Evan McDade has a Davco DR30 and
perhaps has an extra RF board.

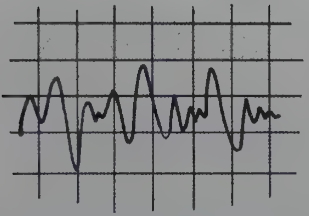
P29 RF Q1 K1504 (KMC) MOT 3N157—8
P31 MIX Q3 K1004 (KMC) N-CH MOT 3N128

DAVCO

DR 30

COMMUNICATIONS RECEIVER





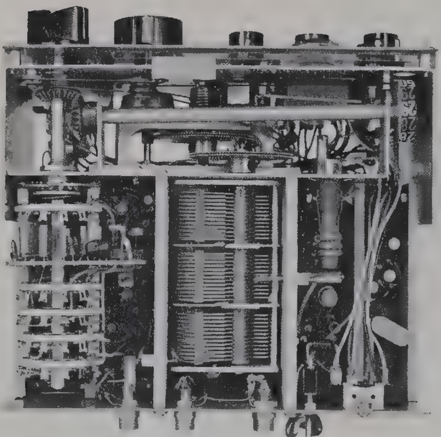
DAVCO ELECTRONICS, INC.

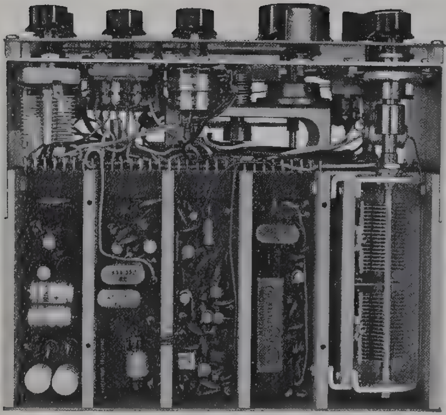
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304
Phone: 224-4322 (area code 904)

A high performance, dual-conversion, communications receiver for amateur applications utilizing solid-state components and featuring field-effect transistor RF stage for greater sensitivity, better image rejection and exceptional freedom from cross modulation or overloading on strong signals. The DR-30 provides the maximum in communication effectiveness under the most rigorous operating conditions. Full amateur band coverage on SSB, CW or AM, Collins mechanical filter, crystal stability and extra built-in QRM-cutting features make the DAVCO DR-30 the finest and most reliable receiver for use on today's crowded bands.

DAVCO DR-30

COMMUNICATIONS RECEIVER





NOW! The DR-30 receiver provides the extra performance and operating capabilities found only in the finest base-station receiver, combined with the rugged construction, tuning ease and compact size (4″ H x 7⅛″ W x 6″ D) of a mobile unit. DAVCO's "Amateur Engineered" DR-30 meets the challenges put to it by the most demanding amateurs, no matter the preference in bands or modes of operation, and is an excellent choice for fixed, mobile or portable operation.

FIELD-EFFECT RF STAGE: Field-Effect transistors are the revolutionary new solid-state devices that make cross-modulation and overloading problems a thing of the past; they also allow superior image rejection and extreme sensitivity for weak-signal reception.

FULL COVERAGE: Complete ham-band coverage of 80 through 10 meters, the first half-megacycle of 6 meters, WWV and the 31 meter SWL band on 9.50-10.050 Mc, and optional coverage of any two additional 550 kc segments between 3.5 and 54 Mc (for CB, MARS, further 6-meter coverage, etc.)

VARIABLE SELECTIVITY: Front-panel selection of your choice of a wide IF for AM reception (6 selective elements giving a nominal 5 kc bandwidth), or a Collins 2.1 kc mechanical filter for superb SSB selectivity, or an ultra-sharp crystal filter for crowded-band CW use.

DETECTORS: Linear AM detector, separate product detector for SSB and CW utilizing a crystal-controlled BFO and carrier generator for USB and LSB.

NOISE LIMITER: True blanking action occurs before selectivity lengthens noise pulses; extremely effective on power-line and ignition-type interference.

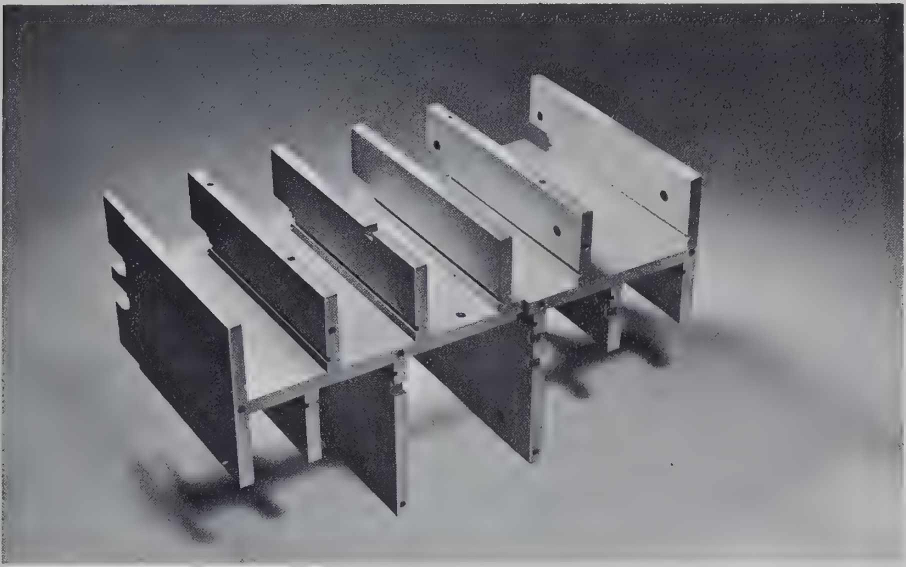
REJECTION NOTCH: Tunable notch provides more than 50 db rejection of undesired carrier. Pulls SSB and AM stations through under otherwise impossible conditions.

AGC: Full automatic gain control action on all modes, with selection of fast, medium or slow release time.

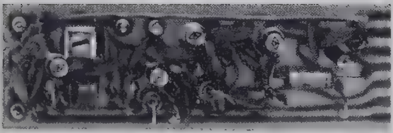
PLUS ALL THESE PERFORMANCE EXTRAS:

• Transmitter-type VFO • Crystal-controlled 1st oscillator • Separate RF and AF Gain controls
• Illuminated dial and S-meter • Built-in 100 kc. crystal calibrator
• Fully solid state—operates directly from 12-15 volts DC or accessory AC supply.

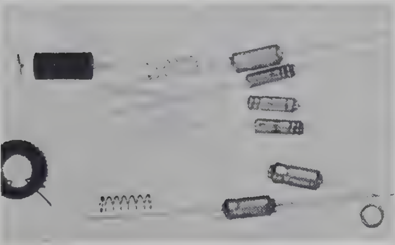
DAVCO ELECTRONICS, INC., TALLAHASSEE, FLORIDA



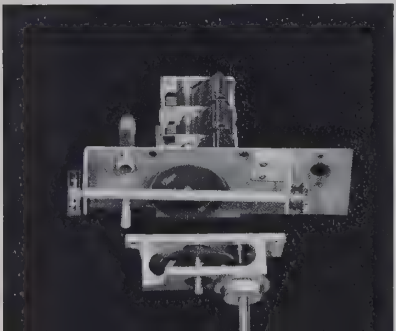
A rugged, solid 3/16″ thick aluminum extrusion forms the backbone of the DR-30. This design technique (a DAVCO "first" in amateur radio design) is the basis for the extreme, rock-like stability of the DR-30.



Another DAVCO "first" for ham radio. The circuitry of the DR-30 is contained on nine plug-in modules for easy access. Circuit boards are glass epoxy to match the ruggedness of the extruded chassis. No more hours of tracing and searching for individual circuits.



Only highest quality components are used throughout the DR-30 to assure you of years of trouble-free performance. All wiring features heat-resistant Teflon covered wire in case you can't resist the urge to tinker.



High-ratio, spring-loaded, split gears give s-m-o-o-t-h tuning and the slide rule dial indicator provides direct readout after calibration. The result—zero in on that SSB signal with the greatest of ease and know that you're "right on frequency".

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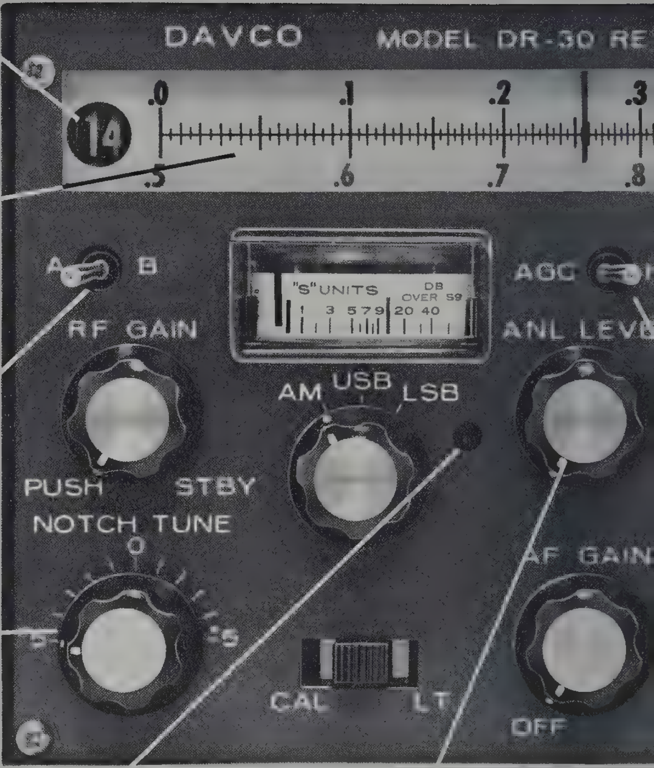
2. Main tuning dial is same for all bands, not reverse reading. Assures accurate calibration of all bands. Overlap at top of frequency ranges permits DX-ing on 10 meters, some MARS coverage on 4MC, etc.

3. Toggle switch provides high-frequency audio roll-off (tone control) in "A" position, especially effective with wide selectivity and for foreign broadcast reception. "B" position connects to station accessory through Jones plug on rear if desired; can be used for phone patch, coax relay, external power supply or converter, etc.

4. Notch rejection filter is tunable across IF passband; gives up to 60db. rejection of unwanted carriers or whistle for QRM-free reception.



5. Dial calibration trimmer compensates for long-term aging. Superb stability of receiver eliminates constant dial juggling.

6. Noise limiter is blanking type, before main selectivity. Extremely effective on ignition-type noise and designed particularly for SSB and CW use.

PROFESSIONAL USERS:

You are invited to communicate with us regarding your special receiver requirements. The DAVCO Model CV-30 is based upon the proven design and capabilities of the DR-30, but it is available in rack-mounted, portable or cased versions, with or without power supplies, with variable tuning or up to 24 crystal-controlled channels. We can provide units especially suited for WWV reception, radio astronomy, bio-telemetry, geophysical experiments, monitoring of communications channels, etc.

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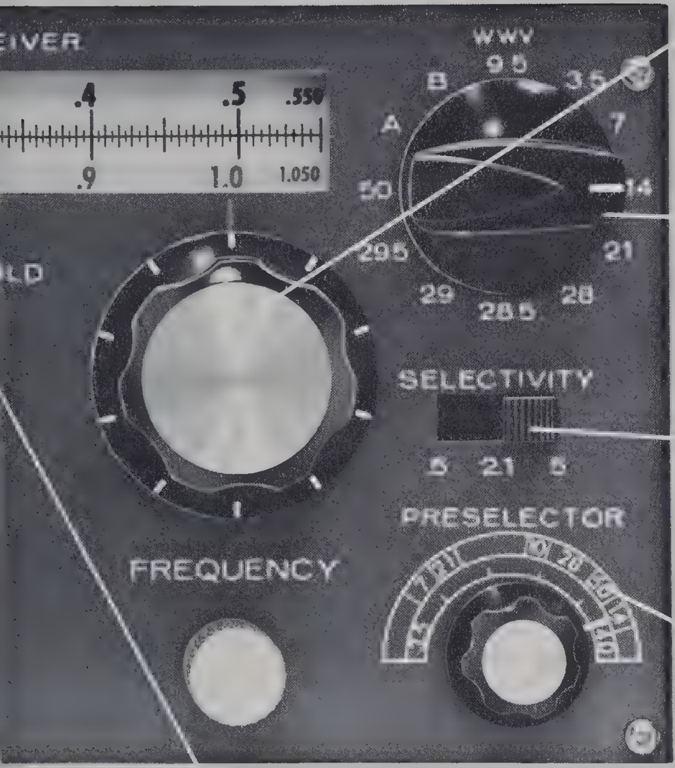

7. Three-position switch selects hold time of AGC circuit; center no hold, left 200 msec., right 800 msec.

8. Main tuning knob is coupled to high precision dial mechanism. Incorporates ball bearings and spring-loaded split gears, for smooth, effortless tuning, zero backlash.

9. Receiver covers all of 80, 40, 20, 15, 10 meter bands first 550 kc. of 6 meter band, the 9.5-10.050 range for WWV and foreign broadcast, and two extra positions are available for installation of crystals for other ranges.

10. Your choice of selectivities: a wide one for AM, a Collins 2.1 kc mechanical filter for SSB and crowded band reception of AM, and a sharp crystal filter for CW.

11. Preselector tunes extremely high-Q circuits for maximum performance on each portion of each band. No compromise RF setting. Superb sensitivity on all bands.

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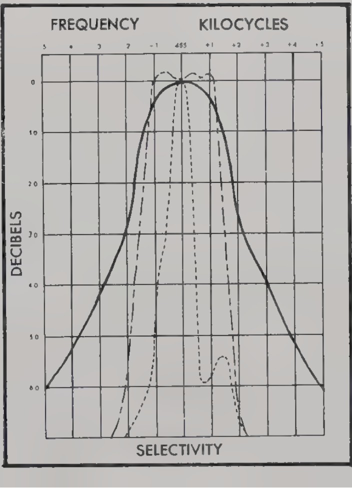


SPECIAL TECHNICAL FEATURES

The DAVCO DR-30 is a double-conversion superhet which employs 38 solid-state devices in circuitry designed to give the maximum in performance and versatility. There are no compromises.

The DR-30 incorporates field-effect transistors in both the RF stage and the first mixer. These devices operate at high impedances and permit better image rejection, and their inherent low noise provides outstanding sensitivity in weak-signal reception. Their greatest advantage, however, is that cross-modulation and overloading from strong stations just aren't problems any more: the DR-30 sounds quiet between stations and weak signals just pop out of the background. This also eliminates the necessity for attenuating strong signals before they reach the RF stage, since this practice is undesirable in its effects on weak signals.

Selectivity is accomplished by the use of 3 IF transformers, three ceramic Transfilters®, a 455 kc crystal filter, and a 2.1 kc Collins mechanical filter in various combinations. Switching from one to the other is done by means of switching diodes operated by DC from the front panel switch.

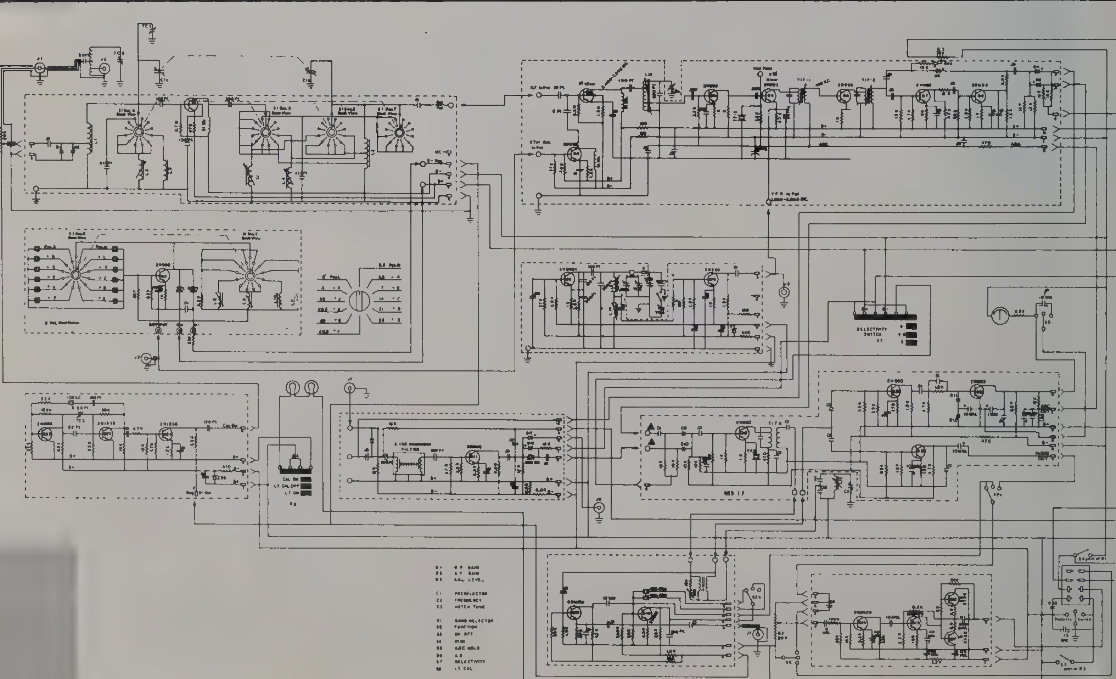
Special toroid coils, used in the VFO and RF sections account in part for the compactness of the unit. For a given Q, a toroid is much smaller, requires less shielding, and is more stable than its normal counterpart.

The noise limiter in this receiver is truly outstanding. It is designed for CW and SSB use, and signals truly indistinguishable without it are often made crystal-clear. Like the DR-30 T-notch filter, it is in the IF portion of the receiver and both of these circuits prevent interference from desensitizing the receiver by actuating the AGC system.

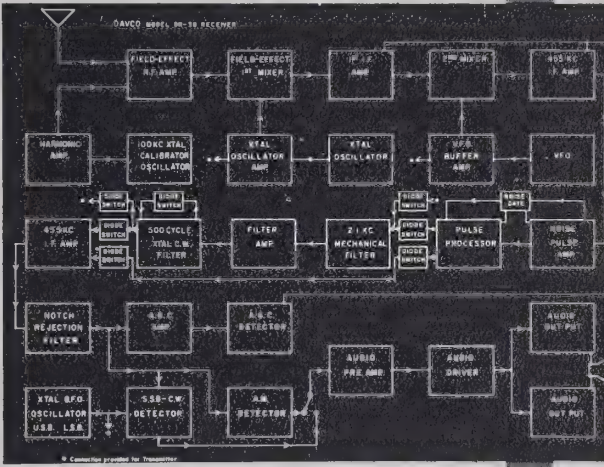
The DR-30 can be used with the chassis at either positive or negative ground; there's a diode for protection from incorrect power supply connection; there's muting provision and built-in RF protection to make it compatible with any existing equipment.

The panel lights can be switched off to reduce drain while operating from batteries, and varying input voltages have no effect on stability. The audio output matches a wide variety of speaker and earphone impedances. There's a dial drag knob which can virtually lock the receiver on a given frequency or allow free-wheeling of the ball-bearing drive unit. Output jacks on the rear of the receiver allow access to the crystal oscillators, the VFO, and the mechanical filter for use with companion transmitters or home-built equipment. There's even a front-panel switch wired to the rear connection plug to allow control of other accessories such as phone patch, antenna selection relay, etc.

The Davco DR-30 is truly a receiver "Amateur-Engineered" to meet the requirements of the most demanding amateur.



TECHNICAL DATA: DAVCO Model DR-30 Communications Receiver



Double conversion superhet, fully transistorized; crystal controlled first oscillator, ten crystals supplied for frequencies below:

3.5— 4.050 Mc
7.0— 7.550 Mc
9.5—10.050 Mc
14.0—14.550 Mc
21.0—21.550 Mc
28.0—28.550 Mc
28.5—29.050 Mc
29.0—29.550 Mc
29.5—30.050 Mc
50.0—50.550 Mc

plus two extra switch positions for other 550 kc segments optional.

SENSITIVITY: better than 1 μv for 10 db s/n; 1 μv for .3 watts audio.

SELECTIVITY: SSB: 2.1 kc Collins mechanical filter.
AM: nominal 5 kc broad IF.
CW: 200 cycle xtal filter in series with mechanical filter for improved skirt rejection.

STABILITY: negligible warm-up change; less than 100 cps change per hour; less than 25 cps for 20% power supply variation.

TUNING: spring-loaded split-gear drive unit, backlash-free; flywheel loading for large band excursions; adjustable dial drag and lock.

CALIBRATION: internal 100 kc crystal calibrator supplied; slide-rule dial has 5 kc markings, hairline pointer; tuning knob has 2 kc marks on perimeter; internal frequency shift for sideband compensation.

SPURIOUS RESPONSES: images and IF down at least 60 db below 22 Mc, at least 35 db 22-54 Mc Internal spurious less than equivalent 1 uv signal at input in ham bands.

FREQUENCY READOUT: significant figure (Mc) appears in indicator window, is color coded as to whether .000-.550 Mc or .500-1.050 section is in use. Can provide direct calibration with accessory crystals.

DETECTORS: linear AM detector; separate product detector for SSB and CW; crystal controlled BFO-carrier generator for USB and LSB.

AGC: full action on all modes of operation; has fast-attack characteristic; panel switch selects fast release (.015 seconds) for AM or break-in, medium (.2 sec.) or slow release (.8 sec) for SSB and CW. Audio output varies 8 db for 80 db change in RF input. AGC action is delayed to 5 microvolts.

NOISE LIMITER: true blanking type action occurs before selectivity lengthens pulses; has separate ANL amplifier and detector, diode noise gate. Front panel control.

RF STAGE: low-noise premium field-effect RF amplifier and mixer; input and output circuits employ high-Q toroidal inductors.

REJECTION NOTCH: tunable notch provides up to 60 db rejection of undesired carrier.

INTERMEDIATE FREQUENCIES: 1st IF: 2.405-2.955 Mc (variable, tracked), 2nd IF: 455 kc.

SEMICONDUCTOR COMPLEMENT:
23 bi-polar transistors
2 field-effect transistors
10 signal diodes
1 power diode
2 zener regulator diodes

AUDIO: .6 watt at 5% distortion; max 1 watt. Output impedance 8 to 45 ohms speaker; 600 ohm earphones preferred.

SIZE: 4″ H, 7⅛″ W, 6″ D. Weight 7 pounds.

POWER REQUIREMENTS: 12 volts DC 300 ma. maximum, 150 ma. maximum without panel lights (switch provided)

DR-30 Receiver $389.50

DAVCO
ELECTRONICS, INC.

DAVCO's Design Philosophy

Through a philosophy—both imaginative and conservative — which combines the newest, improved components with the most sophisticated circuit techniques, DAVCO has been able to conceive and produce some of the finest equipment available to the amateur today.

Our constant and continuing attention to the requirements of the amateur fraternity and our use of only the highest quality materials result in equipment which provides full performance capability . . . great pleasure and confidence in operation . . . and full flexibility for the amateur's every application.

DAVCO ELECTRONICS, INC.
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304

The DR-30 is available direct from the factory. The price of $389.50 includes shipping costs within the U.S.A. A time payment plan requiring 10% down payment is available. Export orders receive prompt attention, and there is no charge for export packaging.

Extra crystals can be installed at the factory in the A and B bandswitch positions covering any 550 kc. ranges between 3.5 and 54 megacycles. The charge is $6.00 per crystal. Crystals can also be user-installed.

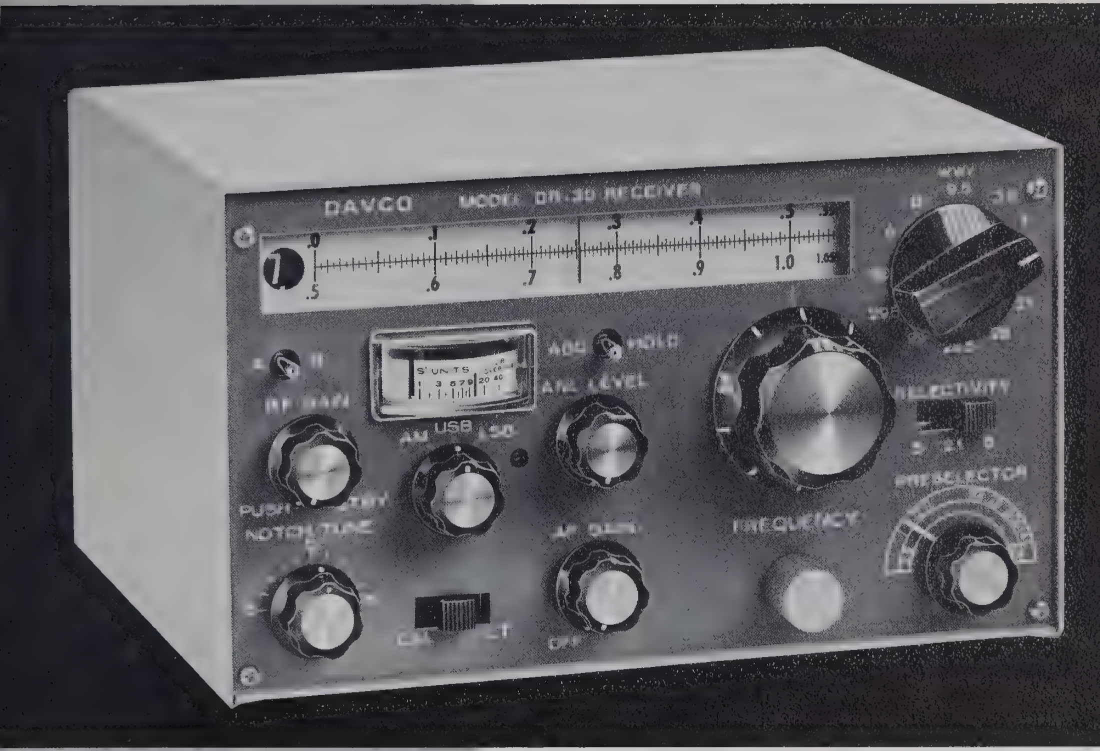
Substitution of ranges other than those provided in the standard DR-30 can be made at extra charge. Please write stating your requirements. For calibration, it is desirable that any extra or substituted bands start on the megacycle or the half-megacycle. Coverage of the CB range can be accomplished by a single crystal providing 26.9 Mc-27-450 Mc. coverage, but a correction of exactly 100 kc. will have to be applied to the frequency reading.

The DR-30 is fully guaranteed for 6 months.

DAVCO

DR 30

COMMUNICATIONS RECEIVER



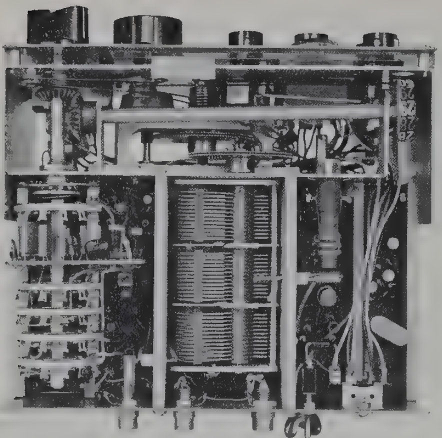
DAVCO ELECTRONICS, INC.

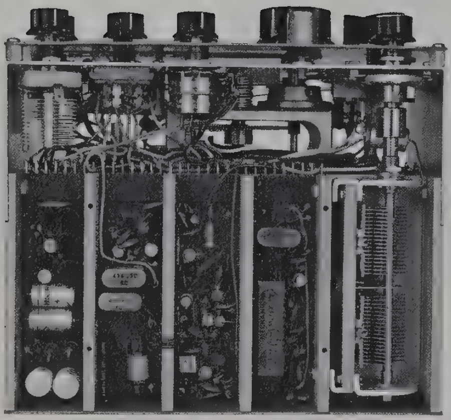
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304
Phone: 224-4322 (area code 904)

A high performance, dual-conversion, communications receiver for amateur applications utilizing solid-state components and featuring field-effect transistor RF stage for greater sensitivity, better image rejection and exceptional freedom from cross modulation or overloading on strong signals. The DR-30 provides the maximum in communication effectiveness under the most rigorous operating conditions. Full amateur band coverage on SSB, CW or AM, Collins mechanical filter, crystal stability and extra built-in QRM-cutting features make the DAVCO DR-30 the finest and most reliable receiver for use on today's crowded bands.

DAVCO DR-30

COMMUNICATIONS RECEIVER





NOW! The DR-30 receiver provides the extra performance and operating capabilities found only in the finest base-station receiver, combined with the rugged construction, tuning ease and compact size (4″ H x 7⅛″ W x 6″ D) of a mobile unit. DAVCO's "Amateur Engineered" DR-30 meets the challenges put to it by the most demanding amateurs, no matter the preference in bands or modes of operation, and is an excellent choice for fixed, mobile or portable operation.

FIELD-EFFECT RF STAGE: Field-Effect transistors are the revolutionary new solid-state devices that make cross-modulation and overloading problems a thing of the past; they also allow superior image rejection and extreme sensitivity for weak-signal reception.

FULL COVERAGE: Complete ham-band coverage of 80 through 10 meters, the first half-megacycle of 6 meters, WWV and the 31 meter SWL band on 9.50-10.050 Mc, and optional coverage of any two additional 550 kc segments between 3.5 and 54 Mc (for CB, MARS, further 6-meter coverage, etc.)

VARIABLE SELECTIVITY: Front-panel selection of your choice of a wide IF for AM reception (6 selective elements giving a nominal 5 kc bandwidth), or a Collins 2.1 kc mechanical filter for superb SSB selectivity, or an ultra-sharp crystal filter for crowded-band CW use.

DETECTORS: Linear AM detector, separate product detector for SSB and CW utilizing a crystal-controlled BFO and carrier generator for USB and LSB.

NOISE LIMITER: True blanking action occurs before selectivity lengthens noise pulses; extremely effective on power-line and ignition-type interference.

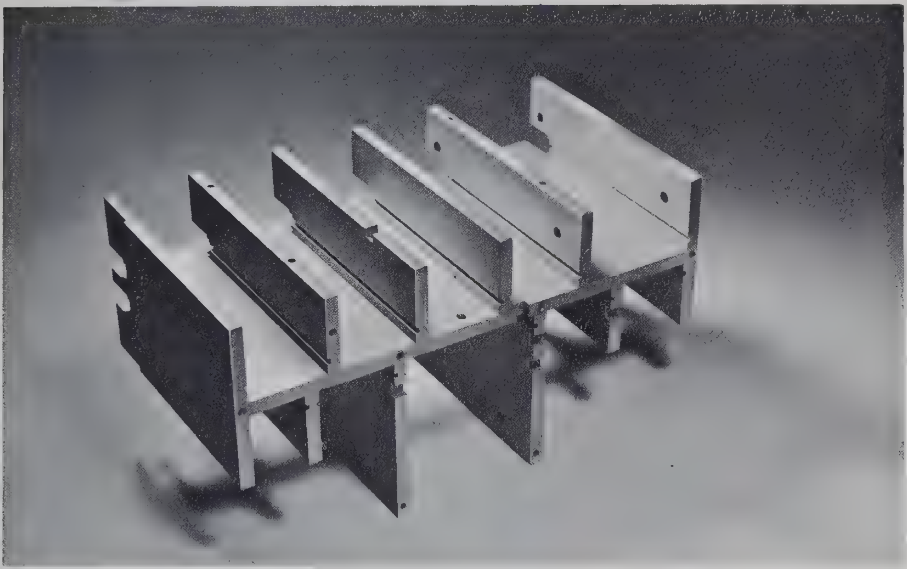
REJECTION NOTCH: Tunable notch provides more than 50 db rejection of undesired carrier. Pulls SSB and AM stations through under otherwise impossible conditions.

AGC: Full automatic gain control action on all modes, with selection of fast, medium or slow release time.

PLUS ALL THESE PERFORMANCE EXTRAS:

• Transmitter-type VFO • Crystal-controlled 1st oscillator • Separate RF and AF Gain controls
• Illuminated dial and S-meter • Built-in 100 kc. crystal calibrator
• Fully solid state—operates directly from 12-15 volts DC or accessory AC supply.

DAVCO ELECTRONICS, INC., TALLAHASSEE, FLORIDA



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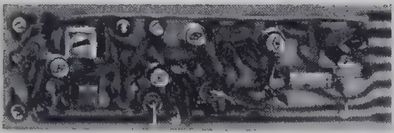

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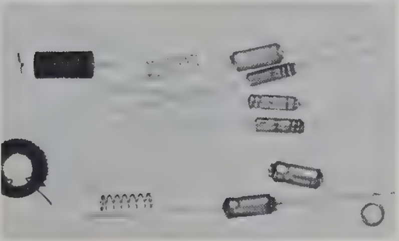

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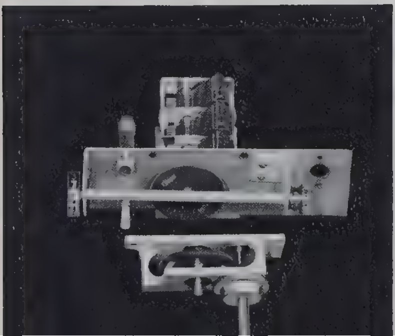

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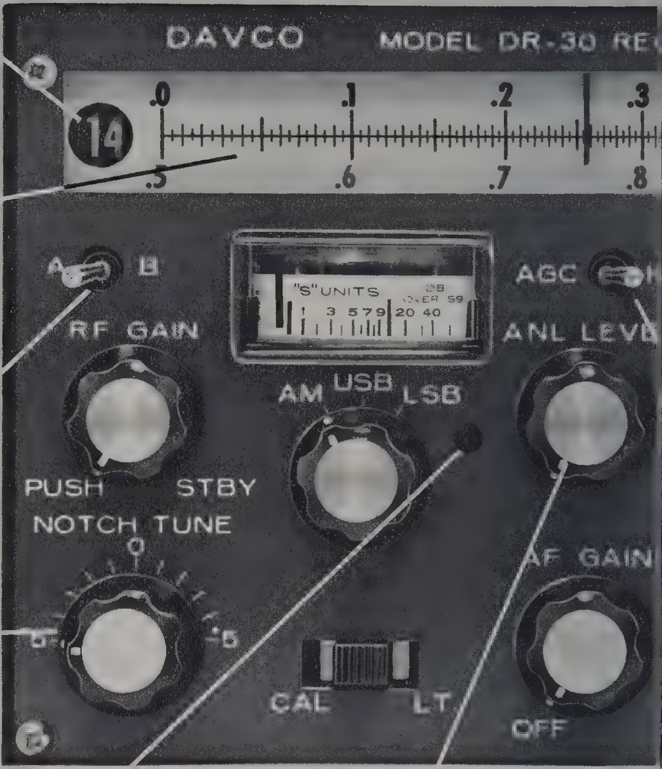

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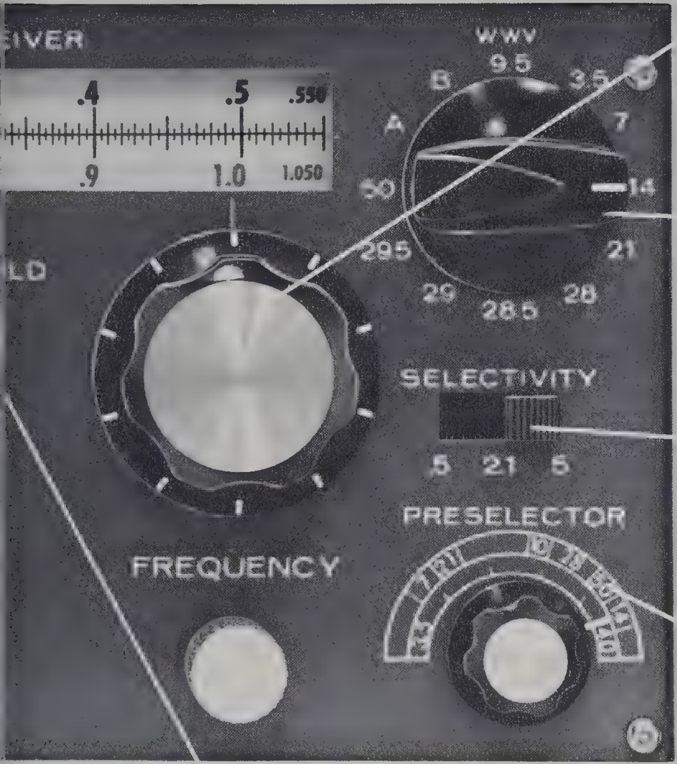

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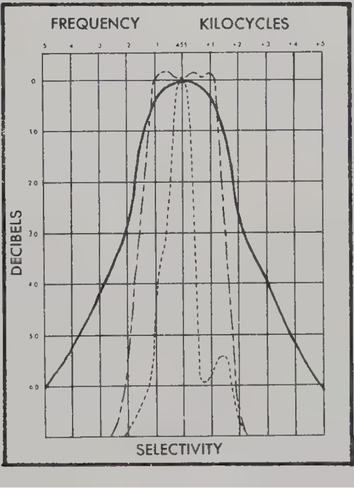

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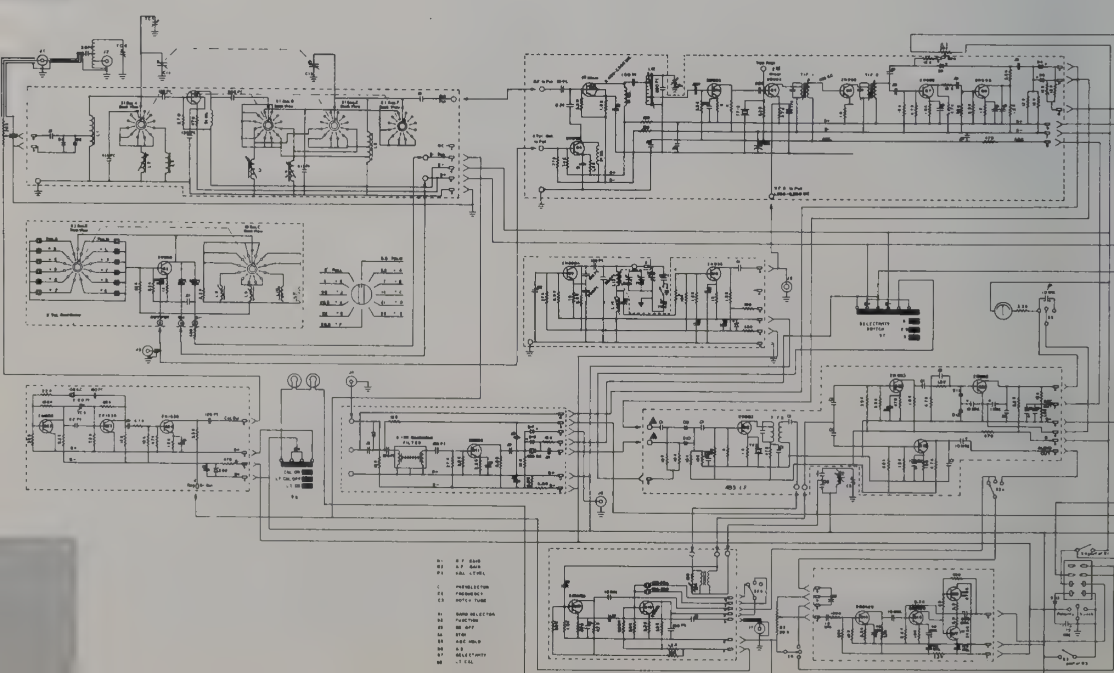

TECHNICAL DATA: DAVCO Model DR-30 Communications Receiver

Double conversion superhet, fully transistorized; crystal controlled first oscillator, ten crystals supplied for frequencies below:

3.5— 4.050 Mc
7.0— 7.550 Mc
9.5—10.050 Mc
14.0—14.550 Mc
21.0—21.550 Mc
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28.5—29.050 Mc
29.0—29.550 Mc
29.5—30.050 Mc
50.0—50.550 Mc

plus two extra switch positions for other 550 kc segments optional.

SENSITIVITY: better than 1 µv for 10 db s/n; 1 µv for .3 watts audio.

SELECTIVITY: SSB: 2.1 kc Collins mechanical filter.
AM: nominal 5 kc broad IF.
CW: 200 cycle xtal filter in series with mechanical filter for improved skirt rejection.

STABILITY: negligible warm-up change; less than 100 cps change per hour; less than 25 cps for 20% power supply variation.

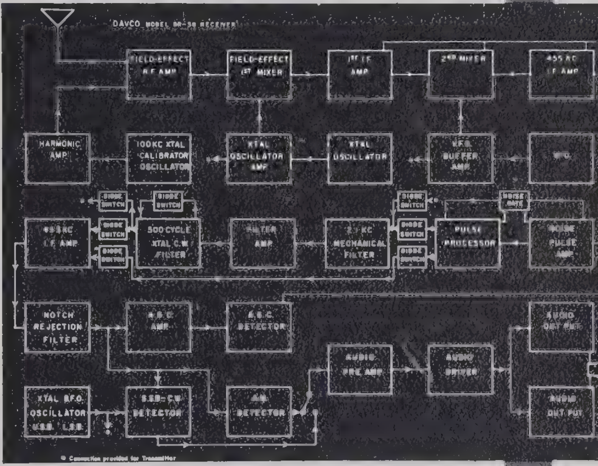
TUNING: spring-loaded split-gear drive unit, backlash-free; flywheel loading for large band excursions; adjustable dial drag and lock.

CALIBRATION: internal 100 kc crystal calibrator supplied; slide-rule dial has 5 kc markings, hairline pointer; tuning knob has 2 kc marks on perimeter; internal frequency shift for sideband compensation.

SPURIOUS RESPONSES: images and IF down at least 60 db below 22 Mc, at least 35 db 22-54 Mc Internal spurious less than equivalent 1 uv signal at input in ham bands.

FREQUENCY READOUT: significant figure (Mc) appears in indicator window, is color coded as to whether .000-.550 Mc or .500-1.050 section is in use. Can provide direct calibration with accessory crystals.

DETECTORS: linear AM detector; separate product detector for SSB and CW; crystal controlled BFO-carrier generator for USB and LSB.



AGC: full action on all modes of operation; has fast-attack characteristic; panel switch selects fast release (.015 seconds) for AM or break-in, medium (.2 sec.) or slow release (.8 sec) for SSB and CW. Audio output varies 8 db for 80 db change in RF input. AGC action is delayed to 5 microvolts.

NOISE LIMITER: true blanking type action occurs before selectivity lengthens pulses; has separate ANL amplifier and detector, diode noise gate. Front panel control.

RF STAGE: low-noise premium field-effect RF amplifier and mixer; input and output circuits employ high-Q toroidal inductors.

REJECTION NOTCH: tunable notch provides up to 60 db rejection of undesired carrier.

INTERMEDIATE FREQUENCIES: 1st IF: 2.405-2.955 Mc (variable, tracked), 2nd IF: 455 kc.

SEMICONDUCTOR COMPLEMENT:
23 bi-polar transistors
2 field-effect transistors
10 signal diodes
1 power diode
2 zener regulator diodes

AUDIO: .6 watt at 5% distortion; max 1 watt. Output impedance 8 to 45 ohms speaker; 600 ohm earphones preferred.

SIZE: 4″ H, 7⅛″ W, 6″ D. Weight 7 pounds.

POWER REQUIREMENTS: 12 volts DC 300 ma. maximum, 150 ma. maximum without panel lights (switch provided)

DR-30 Receiver **$389.50**

DAVCO

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DAVCO's Design Philosophy

Through a philosophy—both imaginative and conservative — which combines the newest, improved components with the most sophisticated circuit techniques, DAVCO has been able to conceive and produce some of the finest equipment available to the amateur today.

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2024 South Monroe Street
Tallahassee, Florida 32304

The DR-30 is available direct from the factory. The price of $389.50 includes shipping costs within the U.S.A. A time payment plan requiring 10% down payment is available. Export orders receive prompt attention, and there is no charge for export packaging.

Extra crystals can be installed at the factory in the A and B bandswitch positions covering any 550 kc. ranges between 3.5 and 54 megacycles. The charge is $6.00 per crystal. Crystals can also be user-installed.

Substitution of ranges other than those provided in the standard DR-30 can be made at extra charge. Please write stating your requirements. For calibration, it is desirable that any extra or substituted bands start on the megacycle or the half-megacycle. Coverage of the CB range can be accomplished by a single crystal providing 26.9 Mc-27-450 Mc. coverage, but a correction of exactly 100 kc. will have to be applied to the frequency reading.

The DR-30 is fully guaranteed for 6 months.

davco electronics, inc.

P. O. Box 2677 ● (Area Code 305) 224-4322
2024 S. Monroe St., **Tallahassee, Florida**

April 11, 1966

Mr. Everett McDade
Skyland
North Carolina

Dear Mr. McDade:

Enclosed are copies of the minutes of meetings to date of the Board of Directors and Finance committee of DAVCO ELECTRONICS, INC. We shall continue to send you information regarding the operation of the company in the coming months.

Operations under the expanded programs which have been outlined to you have been proceeding, and there is every indication that our long-term goals will be met. The current planned production rate is six units per week: this allows a gradual reduction of our order backlog and is a preliminary to production expansion in the second quarter, by the end of which the rate will be about doubled.

Several persons have been added to our staff and materials are being assembled for the production of larger quantities of units. Since we will have caught up with our present order backlog sometime in June, the sales program resumes this month: You will receive copies of some of the new advertising materials shortly. The areas of production, accounting, materials control, purchasing and sales have undergone intense study by the Board and by the employees of the Corporation and each has been organized for maximum results. And, of course, the happiest indicator of progress is the response from our customers: the word does seem to be getting around that our products are truly superior.

You are, of course, welcome at the DAVCO factory at any time, but we would like to extend a special invitation to you to attend meetings of the Board of Directors. Meetings are currently on the second and fourth Thursdays, at 12:30 PM at the Skyline Restaurant. We would suggest that you call us in advance when possible.

Thank you very much.

Very truly yours,

DAVCO ELECTRONICS, INC.

Jim

James F. Lovette
President

DAVCO--Prospective Stockholders
Tallahassee Dining Room

January 13, 1966
7:00 A. M.

Present: Mr. Samuel E. Teague, presiding, Dr. Butler, Mr. Culpepper, Mr. Homer Brinkley, Mr. Robert Brinkley, Dr. Hubbard, Mr. Lewis, Mr. Lovette, Mr. Harold Mendelson, Mr. Sidney Mendelson, Dr. Miers, Mr. Shiell, Mr. Mobley, Mr. Smith, Dr. Stone, Mr. Bartow Rainey, Mr. Woodward.

Mr. Samuel E. Teague explained the purpose of the meeting, which was to acquaint the prospective new stockholders with the nature of the venture, and to determine their degree of interest in investing.

Mr. Lovette, Dr. Hubbard, and Mr. Smith explained the history, background, technical and business details of the corporation.

Mr. Samuel E, Teague stated that each share of the new stockholders would involve an investment of $5,000.00, $2,500.00 of which would be payable almost immediately and the other $2,500.00 in about six months, in return for which each share would receive 3% interest in the corporation.

Mr. Culpepper suggested the feasibility of issuing a combination of stock and bonds for the investment instead of all stock, and this suggested arrangement was noted for future consideration.

The time limit for deciding whether to invest or not was set for 3:00 P.M., Monday, January 17, 1966, by notifying Sidney Mendelson.

The meeting was adjourned.

Signed ____________________
Mr. Sidney W. Mendelson

DAVCO--Prospective Stockholders January 31, 1966

Tallahassee Dining Room 7:00 A. M.

Present: Mr. Samuel E. Teague, presiding, Dr. Miers, Mr. Ashcroft Mr. Homer Brinkley, Mr. Lewis, Mr. Robert Brinkley, Mr. Robinton, Mr. Williamson, Mr. Harrison, Mr. Rankin, Dr. Stone, Mr. Lovette, Dr. Hubbard, Mr. Smith, Mr. Mendelson, Mr. Shiell, Mr. Cawthorn, Mr. Bartow Rainey, Mr. Dennett Rainey, Mr. Langford, Mr. Mobley.

Method of investing in the Corporation was discussed. Until proper legal steps are taken funds will be sent to and held by "Sidney Mendelson as Escrow Agent."

The financial statement was reviewed and the general financial status discussed.

General Discussion.

Signed________________________________

Sidney W. Mendelson

DAVCO--Prospective Directors February 1, 1966
111 S. Monroe Street 9:00 A.M.

Present: Mr. Homer Brinkley, Mrs. Smith, Mr. Lovette, Dr. Hubbard Mr. Samuel E. Teague, Mr. Mendelson, Mr. Smith, Mr. Robert Brinkley, Mr. Langford, Mr. Lewis, and Mr. Ashcroft.

Mr. Samuel E. Teague presided and stated the purpose of the meeting to be to discuss plans for the start-up of operations through immediate advancement of $10,000.00 by a few of the prospective investors, even though it will be some weeks before final reorganizing can be accomplished.

Mr. Lovette discussed use to which the money will be put, and plans for the next few months.

It was agreed a letter will be written to each order not shipped against which a deposit has been made advising a definite delivery date and availability of refund if desired.

Mr. Robert Brinkley will be responsible for investigating new quarters.

The need for a Comptroller was discussed and approved.

The need for a strong employment contract and term life insurance coverage on Mr. Lovette were discussed and approved.

Mr. Ashcroft agreed to act as coordinator for the procurement of a Comptroller.

The proposed employment contract was discussed in general, and approved.

It was agreed to employ Dr. Hubbard on a consulting basis for $3000.00 per year.

Finance Committee appointed: Mr. Lovette, Chairman, Dr. Hubbard, Mr. Mendelson, Mr. Ashcroft, and Mr. Langford.

Regular meeting time and place on weekly basis until further notice.-Thursday, 12:30 P.M. Skyline Restaurant.

The meeting was adjourned.

Signed ______________________
Mr. Sidney W. Mendelson

DAVCO--Finance Committee
Skyline Restaurant

February 1, 1966
1:30 P.M.

Present: Dr. Hubbard, Mr. Lovette, Chairman, Mr. Ashcroft, Mr. Langford, and Mr. Mendelson.

Mr. Lovette reviewed proposed expenditures through April 15, 1966

Upon motion duly made and adopted a budget of $35.932.00 through April 15, 1966 was approved.

Upon motion duly made and adopted a work order for 100 new units to be produced as soon as materials can be assembled was authorized.

Upon motion duly made and adopted the following bank accounts were authorized: Operating Account--Require one of four signatures, Principal Account--Require two of four signatures, Escrow Account--Require two of four signatures.

The meeting was adjourned.

Signed ____________________
Mr. Sidney W. Mendelson

DAVCO--Board of Direcotrs
111 S., Monroe Street

February 3, 1966
12:30 P. M.

Present: Mr. Samuel E. Teague, presiding, Dr. Hubbard, Mr. and Mrs. Smith, Mr. Lovette, Mr. Ashcroft, Mr. Mendelson, Mr. Robert Brinkley, Mr. Langford, Mr. Lewis, Mr. Homer Brinkley.

Mr. Lovette brought the directors up to date on production since last meeting.

Upon motion duly made and adopted Mr. Samuel E. Teague was elected temporary Chairman.

Mr. Lovette reported for the Finance Committee, per meeting of February 1, 1966. Upon motion duly made and adopted the acts of the committee were ratified, which consisted of purchase authorizations for the completion of 71 units in work and a new work order for 100 additional units.

Upon motion duly made and adopted a "General Description of Production Procedures for the DR-30 Receiver" was adopted as policy.

Mr. Robert Brinkley reported for the Committee to recommend new quarters; they will meet with Mr. Bob Williamson of the Committee of 100 as soon as this meeting is concluded.

Mr. Langford reported for the Committee to arrange a meeting place that arrangements have been made to meet at the Skyline Restaurant for the next three Thursdays at 12:30: P. M.

Mr. Ashcroft asked for guidelines for the employment of a Comptroller. The directors discussed the matter and established several tenets for such employment.

Mr. Lovette submitted a proposed letter to customers who have made advance deposits, which after several changes, was approved.

Mr. Lovette submitted a proposed letter to new investors who are not members of the board, to bring them up to date on recent developments. This letter was approved after minor changes.

Upon motion made duly and adopted the meeting was adjourned.

Signed ____________________
Mr. Sidney W. Mendelson

DAVCO--Board of Directors
Skyline Restaurant

February 10, 1966
12:30 P. M.

Present: Mr. Samuel E. Teague, presided, Mr. Homer Brinkley, Mr. Lewis, Mr. Mendelson, Mr. & Mrs. Smith, Dr. Hubbard, Mr. Evans, Mr. Langford, Mr. Lovette, and Mr. Robert Brinkley.

Absent: Mr. Ashcroft

The minutes of the meetings of 1/13/66, 1/31/66, 2/1/66 and 2/3/66 were read and upon motion duly made and adopted were approved.

Mr. Robert Brinkley reported the new Quarters Committee is investigating the possibility of locating in the new Industrial Park, but will also explore other locations.

Mr. Lovette and Dr. Hubbard reviewed the Executive Summary Report for the week ending 2/4/66, [illegible] The report was discussed by those present, and generally approved.

Mr. Mendelson was asked to expedite the employment contract.

Upon motion duly made and adopted a blanket bond on all employees was directed purchased in the temporary amount of $10,000.00 on each person, with the final determination of amount to be made at the next meeting.

Mr. Lovette reported an additional engineer is needed, and there is a well qualified man who may be available. Upon motion duly made and adopted Mr. Lovette was authorized to investigate furthur and report back at the next meeting.

Mr. Smith advised a special meeting of the existing board will be held tomorrow, February 11, 1966, at which time a new board of directors will be chosen.

The meeting was adjourned.

Signed ______________________
Mr. Sidney W. Mendelson

DAVCO--Finance Committee
Skyline Restaurant

February 16, 1966
12:30 P. M.

Present: Mr. Lovette, Dr. Hubbard, Mr. Mendelson, Mr. Langford.

Absent: Mr. Ashcroft

Mr. Lovette presented in general four Life Insurance policy plans that have been submitted to him. After discussion Dr. Hubbard was asked to have an insurance expert at F. S. U. analyze the plans and make recommendations.

Mr. Lovette submitted proposed "Policies Concerning Hourly Employees" (Page #9 of "General Description of Production Procedures for the DR-30 receiver"), and "Travel and Sales Expenses" (also Page #9). Upon motion duly made and adopted the recommendation was approved.

Mr. Lovette submitted data on fidelity bond programs. After discussion it was agreed to recommend to the board 10,000.00 coverage with a blanket position bond at a premium cost of $221.00 for 3 years.

Mr. Lovette reported the proposed employment contract has not as yet been roughed out by the attorney.

Upon motion duly made and adopted an advance materials release for 100 units scheduled to be produced commencing June 13, 1966 was authorized, parts for which are to be ordered according to reasonable lead time requirements.

The near-future need for larger facilities was stressed by Mr. Lovette.

Mr. Lovette recommended the following accounts, authorized signatures for each, and depositaries:

Acct. Name	Authorized Signatures	Number of Signatures Req.	Bank
General Acct.	Jim Lovette, C. Smith M. Ashcroft, S. Mendelson	2	Lewis State
Escrow Acct.	SAME AS ABOVE	2	Capital City
Special Acct.	J. Lovette, K. Evans, M. Ashcroft, Controller	1	Lewis State

Adjourned.

Signed ____________________
Mr. Sidney W. Mendelson

DAVCO--Board of Directors
Tallahassee Dining Room

February 17, 1966
1:00 P. M.

Present: Mr. Samuel E. Teague, presided, Mr. Lewis, Mr. Homer Brinkley, Mr. Robert Brinkley, Mr. & Mrs. Smith, Mr. Langford, Mr. Ashcroft, Mr. Lovette, Dr. Hubbard, and Mr. Sidney Mendelson.

Absent: None

The minutes of the board meeting of 2/10/66 were read and upon motion duly made and adopted were approved.

The minutes of the Finance Committee meeting of 2/16/66 were read and upon motion duly made and adopted were ratified and approved, as corrected.

Upon motion duly made and adopted the following accounts, authorized signatures for each, and depositaries were authorized:

Acct. Name	Authorized Signatures	Number of Signatures Req.	Bank
General Acct.	J. Lovette, C. Smith M. Ashcroft, S. Mendelson	2	Lewis State
Escrow Acct.	SAME AS ABOVE	2	Capital City
Special Acct.	J. Lovette, K. Evans M. Ashcroft, Controller	1	Lewis State

Dr. Hubbard presented and reviewed the Executive Summary Report for the week of February 7-11.

Mr. Brinkley reported that the Building Committee is continuing its efforts to locate new quarters. The Chairman appointed Mr. Brinkley as Chairman of the Building Committee.

Dr. Hubbard outlined financial needs in the near future. It was agreed to issue stock to new stockholders in a sufficient amount to realize 10,000.00 cash.

Dr. Hubbard and Mr. Lovette presented a sales plan for the balance of the year, indicating it will be necessary to increase production as rapidly as possible in order to meet expected orders.

Mr. Brinkley submitted a complete insurance coverage program to protect the interests of the Corporation. The Chairman directed Mr. Lovette and Mr. Brinkley to confer and make recommendations at the next meeting.

The meeting was adjourned.

Signed ____________________
Mr. Sidney W. Mendelson

SPECIAL MEETING

DAVCO--Board of Directors
Tallahassee Dining Room

February 17, 1966
2:00 P. M.

Present: Mr. Samuel E. Teague, presiding, Mr. Lewis, Mr. Robert Brinkley, Mr. Homer Brinkley, Mr. and Mrs. Smith, Mr. Langford, Mr. Murt Ashcroft, Mr. Lovette, Dr. Hubbard, **and Mr. Sidney Mendelson.**
Absent: None

Upon motion duly made and adopted the following officers were elected:

President-Mr. James Lovette
Vice-President-Mr. Keith Evans
Secretary-Mr. Sidney Mendelson
Treasurer-Mr. Cyril Smith
Comptroller-Not filled

The chairman directed that an employment contract with Mr. Lovette be drafted.

Upon motion duly made and adopted it was stipulated the necessary steps be taken to provide for a Chairman of board.

Adjourned

Signed ______________________
Mr. Sidney W. Mendelson

DAVCO--Board of Directors
Skyline Restaurant

March 3, 1966
12:30 P. M.

Present: Mr. Samuel E. Teague, presiding, Mr. Robert T. Brinkley, Dr. Hubbard, Mr. Cheever Lewis, Mr. & Mrs. Cyril Smith, Mr. Murt Ashcroft, Mr. George Langford, Mr. James Lovette, and Mr. Sidney W. Mendelson.

Absent: Mr. Homer A. Brinkley

The minutes of the regular meeting of February 17, 1966, and the special meeting of the same date were read and upon motion duly made and adopted were approved.

Upon motion duly made and adopted Mr. Samuel E. Teague was elected Chairman of the board.

Mr. James Lovette and MR. Robert Brinkley reported they will make recommendations on insurance at the next meeting.

Mr. James Lovette reported a number of applicants have been interviewed for the position of Comptroller, and it is anticipated one can be selected in the near future.

Mr. James Lovette reported the first draft of the employment contract has not yet been received from the attorney.

Upon motion duly made and adopted management was directed to send on a monthly basis a copy of the minutes and summary reports to all persons who have invested in DAVCO.

It was agreed all such persons would be invited to any and all meetings of the board.

Mr. James Lovette discussed personnel, production and sales plans.

There was general discussion on possible sites to which DAVCO might relocate.

The Executive Summary Report was submitted and discussed in detail.

Upon motion duly made and adopted the meetings of the board were scheduled in the future for the 2nd and 4th Thursdays, except for the monthe of March, in which the meetings were set for the 2nd and 5th Thursdays.

The feasibility of Computer accounting for the Corporation was discussed.

The meeting was adjourned.

Signed ______________________
Mr. Sidney W. Mendelson

DAVCO--Board of Directors March 10, 1966
Skyline Restaurant 12:30 P. M.

Present: Mr. James Lovette, presiding, Mr. Murt Ashcroft, Mr. & Mrs. Cyril Smith, Mr. Homer Brinkley, Mr. Robert Brinkley, Dr. Hubbard, Mr. Cheever Lewis, and Mr. Sidney W. Mendelson.

Absent: Mr. George Langford and Samuel E. Teague.

The minutes of the meeting of March 3, 1966 were read and upon motion duly made and adopted were approved.

Mr. James Lovette and Mr. Robert Brinkley submitted a report recommending insurance coverage adequate to protect the corporation, a copy of which is attached hereto and made a part of these minutes. Upon motion duly made and adopted the insurance program was adopted.

Mr. James Lovette reported the first draft of the employment contract should be completed within a week.

Upon the recommendation of Mr. James Lovette and Dr. Hubbard, and upon motion duly made and adopted Mr. G. Wilbur Reed was authorized employed as controller of the corporation at a compensation of $450.00 per month.

Mr. James Lovette reported briefly on several other personnel matters.

Mr. Robert T. Brinkley reported on efforts to locate a larger site for the Corporation, after which there was general discussion.

Dr. Hubbard reported on his investigation of various life insurance plans designed to protect the corporation by covering the life of Mr. James Lovet
Upon motion duly made and adopted Mr. Robert Brinkley was authorized to purchase a ten year decreasing term policy in the amount of $200,000.00.

Dr. Hubbard submitted and discussed the weekly progress report for February 28, 1966 through March 4, 1966, after which there was general discussion.

The meeting was adjourned.

Signed______________________________

Mr. Sidney W. Mendelson

DAVCO-- Board of Directors
Skyline Restaurant

March 31, 1966
12:30 P. M.

Present: Mr. Robert Brinkley, Mr. & Mrs. Cyril Smith, Mr. Homer Brinkley, Mr. Sam Teague, Mr. Sidney W. Mendelson, Mr. Cheever Lewis and Mr. James Lovette

Absent: Mr. George Langford, Mr. Murt Ashcroft and Dr. Charles Hubbard.

Mr. Wilbur Reed, Controller of the Corporation, was present as a guest of the directors.

The minutes of the meeting of March 10, 1966 were read and upon motion duly made and accepted were approved.

Mr. Robert T. Brinkley reported on the two best proposals for life insurance coverage on the life of Mr. Lovette. Mr. Lovette recommended the proposal made by the Employers' Life Insurance Company, and Mr. Brinkley, who was previously authorized to select the insurance company, stated he would implement the plan recommended by Mr. Lovette. This will be a $200,000.00 decreasing term policy.

Mr. James Lovette submitted the Progress Reports for the three week period since the last meeting. These were discussed in detail.

Upon motion duly made and accepted a third work order for 100 units was authorized for production beginning June 20, 1966, with first shipments to begin in July.

Mr. James Lovette reported on his recent trip to New York for an electronics association convention, which he felt was quite successful. He made effective contacts with suppliers, the advertising agency used by the corporation, a ham operator magazine editor and prospective employees with engineering background.

Upon motion duly made and accepted the meeting was adjourned.

Signed ______________________
Mr. Sidney W. Mendelson